Musician's Manual

DIGITAL SAMPLING WORKSTATION MODULE

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ensoniq®

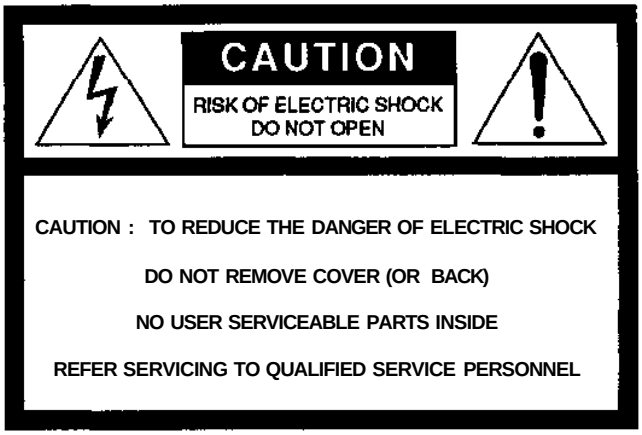
READ THIS FIRST!

WARNING!!

Grounding Instructions

This product must be grounded. If it should malfunction or break down, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This product is equipped with a cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances.

DANGER: Improper connection of the equipment-grounding conductor can result in the risk of electric shock. Check with a qualified electrician or service personnel if you are in doubt as to whether the product is properly grounded. Do not modify the plug provided with this product — if it will not fit the outlet, have a proper outlet installed by a qualified electrician.





This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electronic shock to persons.



This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

SEE IMPORTANT SAFETY INSTRUCTIONS ON BACK COVER!

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EPS-16PLUS

Digital Sampling Workstation Module

Musician's Manual
Version 1.1

EPS-16 PLUS Musician's Manual:

Written, Designed,
and Illustrated by: **Jim Boggia, Bill McCutcheon, Suzanne Kuldell**

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Malvern, PA 19355

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If you have any questions concerning the use of this unit, please contact your authorized ENSONIQ dealer. For additional technical support, or to find the name of the nearest authorized ENSONIQ Repair Station, call ENSONIQ Customer Service at (215) 647-3930 Monday through Friday 9:30 a.m. to 6:30 p.m. Eastern Standard Time.

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IMPORTANT:

"This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been designed to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures."

- reorient the receiving antenna
- relocate the instrument with respect to the receiver
- move the instrument away from the receiver
- plug the instrument into a different outlet so that the instrument and receiver are on different branch circuits

"If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: 'How to Identify and Resolve Radio-TV Interference Problems.' This booklet is available from the U.S. Government printing Office, Washington, D.C. 20402 Stock No. 004-000-00345-4."

In order to fulfill warranty requirements the EPS-16 PLUS should be serviced only by an authorized ENSONIQ Repair Station.

The ENSONIQ serial number label must appear on the outside of the Unit or the ENSONIQ warranty is void.

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Part #9310 0096 01 **Model #MM-61**

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Appendix — EPS-16 PLUS MIDI Implementation

Welcome!

Congratulations, and thank-you for your purchase of the ENSONIQ EPS-16 PLUS Digital Sampling Workstation, another milestone in digital sampling keyboards. The EPS-16 Plus continues the tradition set by the Mirage and the original EPS of providing the latest in sampling technology at an affordable price.

The EPS-16 PLUS revolutionizes the way sampling is integrated into a workstation, by including 24-bit dynamic effects processing. The sonic versatility only a sampler can offer, complete sequencing features, and a polished sound that is a must for your music. Plus all the expressive control that turns a sampler into a musical instrument

Sampling

The EPS-16 PLUS features true 16-bit linear oversampling technology with sampling rates up to 44.6 kHz. CD-quality output circuitry provides state of the art playback performance. The EPS-16 PLUS has all the on-board editing functions you'll ever need. Autolooping, volume smoothing, gain normalization, and multiple types of cross-fading provide complete control over your sampled sounds.

Synthesis Functions

Not only does the EPS-16 PLUS provide superb sampling, it is also a full function synthesizer, allowing you to reshape your sampled sounds with complete freedom. 20 voice polyphony, multiple filters and envelopes, and a comprehensive modulation matrix gives the EPS-16 PLUS unequalled versatility.

Effects

Now combine 24-bit dynamic effects with this sampler/synthesizer and your music really comes to life. Reverb, Chorusing, Flanging, Phasing, Distortion, and Delay add immeasurably to the finished sound of your instruments and sequences. With dynamic control over these effects you can reshape your sound with any performance nuance. Only the EPS-16 PLUS has the ability to resample sounds with effects. For example: add reverb to a drum sample, rcsample it, then reuse the effects processor to further color your music.

Sequencing

The EPS-16 PLUS is more than an expressive sampling instrument, it's also a 16-track sequencing workstation with complete mixdown capabilities. You can record and edit your performances with a wealth of creative tools. Only ENSONIQ sequencers allow you to audition your changes to decide which version to keep.

About the Musician's Manual

This Musician's Manual is your guide to unlocking the full power of the EPS-16 PLUS. At this point, you're probably anxious to plug in your EPS-16 PLUS in and get playing. *Section 1 — Getting Started* is a quick guide covering all the basics for plugging in, hooking up, and getting down to using the EPS-16 PLUS.

After the initial "I just gotta hear it" phase has passed and you're ready to utilize the full potential of the EPS-16 PLUS, please take time to read through the rest of the sections on sampling, programming, sequencing, effects, and storage. They'll provide valuable information and tips, as well as speeding up the learning process and enjoyment of this powerful musical instrument

Thank-you again for choosing ENSONIQ. Enjoy the music!

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The Basics

"Booting" the EPS-16 PLUS

Insert the line cord into the line receptacle on the back of the EPS-16 PLUS. Plug the other end of the cable into a grounded AC outlet (The proper voltage for your EPS-16 PLUS is listed on the Serial Number label on the rear panel) Turn the EPS-16 PLUS power on and make sure the display lights up. If not, check your connections and power source.

The EPS-16 PLUS Operating System—the computer program which tells the hardware what to do — is "disk-based." This means that each time you turn the EPS-16 PLUS on, the first disk you insert must be one containing an EPS-16 PLUS Operating System (see the disk label). In computer-speak, this is called "booting" the machine. Insert the disk with the label facing left and the sliding metal door facing away from you. The display will read LOADING SYSTEM while the O.S. is being loaded. You should always use the latest (highest-numbered) Operating System. If the first disk you put in the drive doesn't contain the EPS-16 PLUS Operating System — the display will flash O.S. NOT ON DISK or DISK NOT FORMATTED. Just remove that disk and insert a proper EPS-16 PLUS O.S. disk.

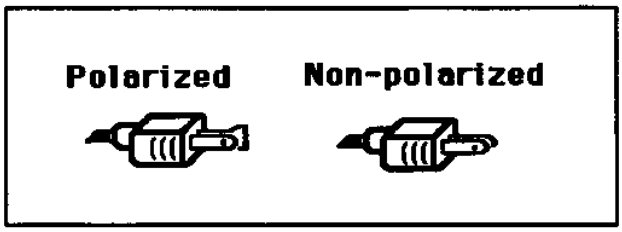
Once it has "booted" the EPS-16 PLUS is ready to operate, but it won't make any sound until you LOAD an instrument into its internal memory and then select that instrument by pressing its *Instrument•Track* button. These functions will be covered later in this section.

Power — Grounding Information

Like many modern electrical devices, your EPS-16 PLUS has a three-prong power cord with earth ground to ensure safe operation. Some products have power cords with only two prongs and no earth ground. To ensure safe operation, modern products with two-prong power cords have polarized plugs that can only be inserted into an outlet the proper way. Some products, such as older guitar amplifiers, do not have polarized plugs and can be connected to an outlet incorrectly. This may result in dangerous high voltages on the audio connections that could cause you physical harm or damage any properly grounded equipment to which they are connected, such as your ENSONIQ product.

To avoid shock hazards or equipment damage, we recommend the following precautions:

- If you own equipment with two pronged power cords, check to see if they are polarized or non-polarized You might consider having an authorized repair station change any non-polarized plugs on your equipment to polarized plugs to avoid future problems.



- Exercise caution when using extension cords or plug adapters. Proper polarization should always be maintained from the outlet to the plug. The use of polarized extension cords and adapters is the easiest way to maintain proper polarity.

- Whenever possible, connect all products with grounded power cords to the same outlet ground. This will ensure a common ground level to prevent equipment damage and minimize hum in the audio output

AC outlet testers are available from many electronic supply and hardware stores. These can be used to check for proper polarity of outlets and cords.

AC Line Conditioning

As is the case with any computer device, the EPS-16 PLUS is sensitive to sharp peaks and drops in the AC line voltage. Lightning strikes, power drops or sudden and erratic surges in the AC line voltage can scramble the internal memory and, in some cases, damage the unit's hardware. Here are a few suggestions to help guard against such occurrences:

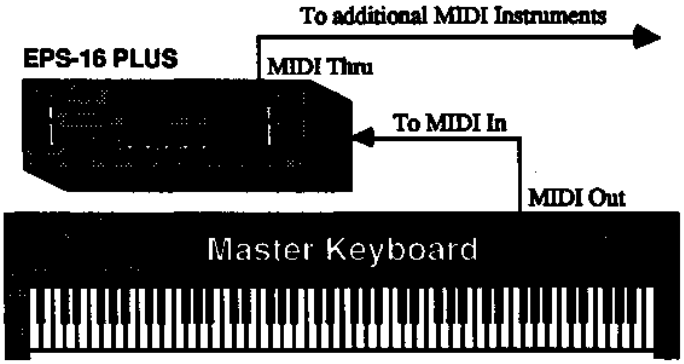
- A Surge/Spike Suppressor. The cheaper of the options, a surge/spike suppressor absorbs surges in AC voltage and protects your gear from all but the most severe over-voltage conditions. You can get multi-outlet power strips with built-in surge/spike suppressors for little more than the cost of unprotected power strips, so using one is a good investment for all your electronic equipment

- A Line Conditioner. This is the best, but by far the more expensive, way to protect your gear. In addition to protecting against surges and spikes, a line conditioner guards the equipment against excessively high or low line voltages. If you use the EPS-16 PLUS in lots of different locations with varying or unknown AC line conditions, you might consider investing in a line conditioner.

MIDI Connections

Of course, you'll need to connect the EPS-16 PLUS to a MIDI keyboard or other controller before it will make any sound at all. Any instrument which has a MIDI Out jack can be used to drive the EPS-16 PLUS.

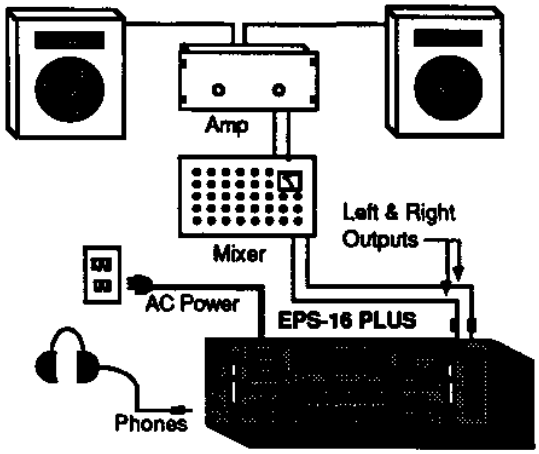
Connect the MIDI Out jack of the master instrument to the MIDI In jack of the EPS-16 PLUS as shown below, using a standard 5-pin MIDI cable.



If you want to drive additional instruments from the same master keyboard, connect the MIDI Thru jack of the EPS-16 PLUS to the MIDI In jack of the next instrument in line. This jack simply "passes on" the signal received at the MIDI In jack without transmitting any data from the EPS-16 PLUS itself.

Amplification

Connect the Audio Outputs of the EPS-16 PLUS to the line level inputs of a mixer, instrument amplifier, stereo, or any other sound system, using 1/4 inch audio cables. If your system is stereo, connect the Left and Right Outputs to two channels of your mixer, stereo, etc. If it's mono, use either of the Audio Outputs, but make sure nothing is plugged into the other output. For listening through headphones, plug the phones into the rear-panel jack marked *Phones*. If you're running the EPS-16 PLUS through a mixer, in stereo, be sure to pan the Left input fully left, and the Right input fully right



It is a good idea to make sure your audio system is turned off (or down) when making connections, to avoid damaging speakers or other components.

Note: The EPS-16 PLUS outputs are line-level, and are intended to be connected only to line-level inputs, such as those on a mixer, stereo pre-amp, keyboard amp, etc. Connecting the EPS-16 PLUS audio outputs to a mic-level input, such as a guitar amp or the microphone jacks on a tape deck, is not recommended, and might result in damage to the device input

Move the volume fader *all the way up*. As with any digital musical instrument, the EPS-16 PLUS will give the best results if you keep the volume slider full on, and use the volume control on your mixer or amp to adjust its level.

Switch the audio system on, and adjust the amplifier volume for normal listening levels. If you hear no sound while playing the keyboard, switch the audio system off and check your connections.

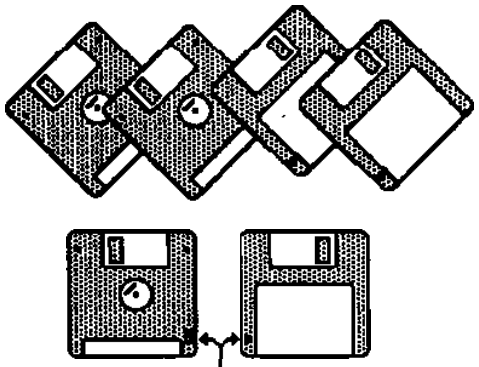
Running Your EPS-16 PLUS Through a Home Stereo System

If you are thinking about amplifying your EPS-16 PLUS through your home stereo, a word of caution. A home stereo is great for playing CD's, albums, tapes — the dynamic range of these media is limited, and your speakers aren't usually subjected to extreme volume changes and frequency transients. While the dynamic range of CD's is significantly greater than LP's or tapes, the output of a CD player is still conservative compared to the uncompressed, unlimited line-level output of a pro-level keyboard. Running your EPS-16 PLUS — or any pro-level keyboard — through a home stereo at high volume levels can damage your speakers, not to mention the impedance mis-match this can create. If your only means of amplification is your home stereo, then try to keep your levels on the conservative side.

Care and Feeding of the Disk Drive

The EPS-16 PLUS' built-in Disk Drive is used to store all your Instruments, Banks, and Sequencer data, as well as System Exclusive messages from other MIDI devices. The EPS-16 PLUS uses a double-sided drive, which can store 800 Kilobytes of data per disk. You should always use Double-Sided Double-Density (DSDD) 3.5" micro-floppy disks for reliable disk operation. The disks are enclosed in a protective plastic carrier with an automatic shutter to protect the diskette from physical damage. It is important not to alter this carrier in any way.

The 3.5" disks have a sliding write-protection tab so that you can protect your sounds and sequences against accidental erasure. Sliding the write-protection tab in the lower left corner of the disk so that the window is closed will allow you to store information on the disk. Sliding the tab so that the window is open will protect the disk against being accidentally reformatted or having files deleted.



Write Protect Tab

Floppy disks are a magnetic storage medium, and should be treated with the same care you'd give important audio tapes. Here are a few Do's and Don'ts concerning disks and the Disk Drive.

Do:

- Use only Double-Sided Double-Density (DSDD) 3.5 inch Micro-floppy disks. These are available from almost any computer store, and many music stores carry them as well.
- Keep your disks and the Disk Drive clean and free of dust, dirt, liquids, etc.
- Label your disks including the Disk Label Number (see *Section 11 — Storage)*, and keep a record of what is saved on each.
- Only transport your unit with nothing in the drive or the yellow plastic disk protector that came with the unit

Don't:

- Use Single-Sided (SSDD or SSSD) disks. These disks have not passed testing on both sides. While a single-sided disk might work successfully with the EPS-16 PLUS, it is possible that you will eventually lose important data to a disk error if you try using Single-Sided disks.
- Put anything other than a disk in the Disk Drive.
- Transport the unit with a disk in the drive.
- Expose disks to extremes of temperature. Temperatures below 50° F and above 140° F can damage the plastic outer shell.

- Subject disks to strong magnetic fields. Exposure to magnetic energy can permanently damage the information on the disk. Keep disks away from speaker cabinets, tape decks, power cables, airline x-ray equipment, power amplifiers, TV sets, and any other sources of magnetic energy.
- Eject the disk while the drive is operating (the Disk Drive light is on).

Disk Memory vs. Internal Memory

The instruments, banks, sequences, and effects which the EPS-16 PLUS plays are stored on double-sided 3.5" micro-floppy disks. Each disk will hold 800 *kilobytes* of data, which translates into 400k *Sample-words,* or about 1600 *Blocks.* (A Block is a handy unit which the EPS-16 PLUS uses to measure Internal and Disk memory — 1 Block=256 samples; 4 Blocks=lk samples.)

Sounds and sequences must be loaded into the internal memory of the EPS-16 PLUS from the disk before they can be played. Once it's loaded into memory, an EPS-16 PLUS sound or sequence is completely independent of the copy on the disk — you can do anything you want to it without harming the version on the disk, unless you intentionally save the changes. You should feel free to experiment as much as you like with the instrument, layer, and Wavesample parameters of any sound that came with the EPS-16 PLUS. As long as you have it safely on the disk you can just reload it and start over if your experiments go awry.

Important: The data in the EPS-16 PLUS' internal RAM Memory is *not* retained when the power is turned off. Anything in memory, whether instruments, banks, or sequencer data, *must* be saved to disk before you switch the power off or it will be gone forever.

Internal Memory

As it comes out of the box the EPS-16 PLUS contains 2 megabyte or 1024K words of internal memory (A *word* is one single sample, or 16 bits.). That's enough for 34.4 seconds of sampling at a 30 KHz sample rate, or about 320,000 notes of sequencer memory.

This internal memory is shared by samples and the sequencer. The memory is distributed *dynamically* between instruments and sequences, which means that the more sounds you have in memory, the less sequencer memory you have, and vice-versa.

FLASHBANK

The optional memory expansion FB-1 or FB-2 FLASHBANKs. FLASHBANK is a semi-permanent storage medium for EPS-16 PLUS instrument files. Any instruments saved to the FLASHBANK can be instantly loaded and will occupy NO blocks of internal memory, though it will take an Instrument/Track slot when loaded Another nice feature of the FLASHBANK is that instruments that are saved to it will remain in memory even when the EPS-16 PLUS is powered down. What this means is that as soon as you power up, the instruments in the FLASHBANK are ready to use.

Sometimes the EPS-16 PLUS Asks for the Operating System Disk

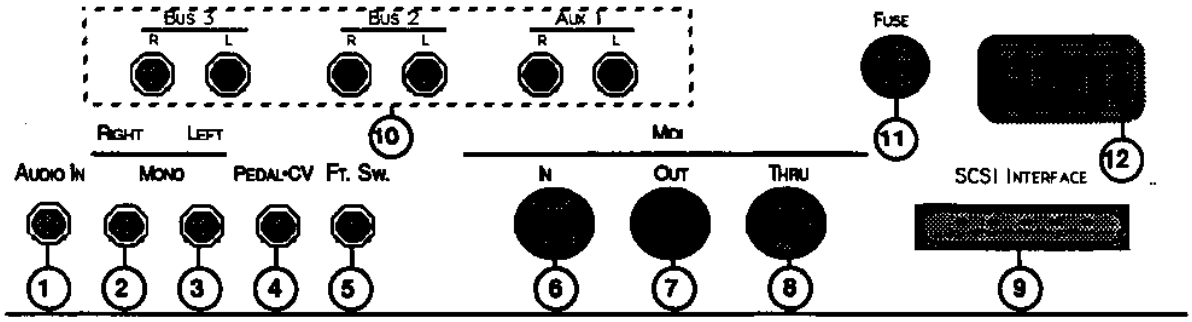
Occasionally, when sequencing, sampling, or performing certain other advanced EPS-16 PLUS functions, you will be confronted with the following message:



When you see this message, it means that in order to complete the current command or edit function the EPS-16 PLUS needs to load a pardon of the Operating System from disk.

If the disk in the drive does not have the EPS-16 PLUS Operating System on it, or if there is no disk in the drive you will see this message. Insert a disk containing the Operating System into the drive and press the *Enter* button, and you will be able to carry on with the function at hand.

Rear Panel Connections



1) Audio In

This jack is the audio input used for sampling into the EPS-16 PLUS. You can switch between mic or line level by pressing the Left or Right Arrow button after entering Level-Detect (VU) mode when sampling.

Specs: 91 KOhm input impedance, AC coupled Maximum input signal before clipping: Line level= 0 dBV (2.828 Vp-p); Mic level= -28 dBV (.108 Vp-p).

2) Right/Mono

To operate the EPS-16 PLUS in stereo, connect this output to a channel of your mixer and pan that channel right Note that *either* of the audio outputs can be used as a mono output If you want to use this jack to listen to the outputs in mono, make sure that nothing is connected to the Left/Mono jack.

3) Left/Mono

When operating the EPS-16 PLUS in stereo, connect this output to a channel of your mixer and pan that channel left. To use this jack to listen to the outputs in mono, make sure that nothing is connected to the Right/Mono jack.

4) Pedal/CV

This jack is for connecting an optional ENSONIQ Model CVP-1 Control Voltage Foot Pedal, which is assignable as a modulator to various parameters within the EPS-16 PLUS.

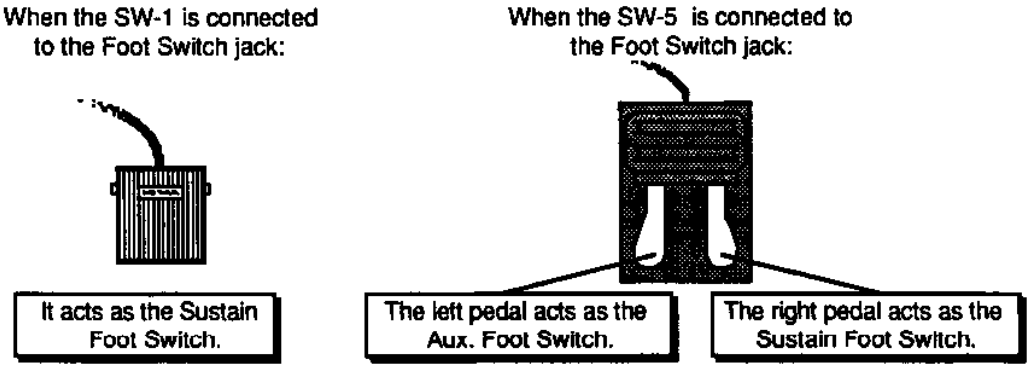
A CV pedal plugged into this jack can also act a volume pedal, controlling the overall volume level of the EPS-16 PLUS. A parameter on the EDIT/System•MIDI page (press *Edit*$_7$ then *System•MIDI*, then scroll until the display reads PEDAL=VOLUME MIDI=7), determines whether the CV pedal will act as a modulator or as a volume pedal. Set to PEDAL=VOLUME to use the CV pedal to control the volume of the EPS-16 PLUS.

Pedal/CV Specs: 3-conductor (Tip=control voltage input, Ring=2 KOhm resistor to +12 Volts, Sleeve= ground). 68 KOhm input impedance, DC coupled. Input voltage range=0 to 10 volts DC. Scan rate=32mS (maximum recommended modulation input= 15 Hz). For use with an external control voltage, use a 2-conductor cable with the voltage on the tip and the sleeve grounded.

5) Foot Switch Input

This jack supports either one or two foot switches depending on what is plugged into it:

- If you plug the ENSONIQ Model SW-1 Foot Switch (which came with your EPS-16 PLUS) into this jack, it will act as a sustain pedal. Holding it down will cause notes to continue to sustain after the key has been released. It can also be assigned to act as the right Patch Select button.
- Or you can connect the optional ENSONIQ Model SW-5 Dual Foot Switch here. The SW-5 is a dual (piano-type) foot switch with two separate pedals. When the SW-5 is connected, the right-hand pedal will act as a sustain pedal and the left-hand pedal will act as an auxiliary foot switch.



There are two parameters on the EDIT/System•MIDI page which let you reassign the footswitches to a variety of functions, including reproducing the actions of the Patch Select buttons and starting and stopping the sequencer. See EDIT/System•MIDI page, in *Section 2 — System Control* for more details.

6) MIDI In

This jack receives MIDI (Musical Instrument Digital Interface) information from other MIDI instruments or computers.

7) MIDI Out

Sends out MIDI information generated by the EPS-16 PLUS'S sequencer to other instruments and computers. Also retransmits incoming MIDI data when TRANSMIT ON=INST CHAN (see *Section 3 — Instruments and Banks* for details).

8) MIDI Thru

"Passes on" all MIDI information received by EPS-16 PLUS to other devices. Information generated by the EPS-16 PLUS itself does not go to this jack — the Thru jack merely echoes what comes in at the MIDI In jack.

9) Optional SCSI (Small Computer System Interface) Connector

This space is for the optional SP-2 SCSI kit which allows the EPS-16 PLUS to transfer data with a SCSI-compatible hard disk, CD ROM player or to exchange information with computers at very high speed.

10) Auxiliary Outputs

The six Auxiliary Outputs (grouped as three stereo pairs) are true polyphonic outputs, not "voice outputs." EPS-16 PLUS voices are assigned dynamically among the stereo outputs and the six Auxiliary Outputs, so that any of these outputs can have up to 20 voices at once if necessary. These three stereo pairs are controlled via a voice routing parameter on the EDIT/Amp page and are in addition to the stereo outputs of the EPS-16. Each Wavesample, or an entire Instrument•Track, can be assigned to any of the three stereo pairs (you can then use the panning functions to utilize the stereo pairs as solo outputs) or to a spot within the main stereo mix. **See** *Section 2—System Control* and *Section 7—Voice Parameters* for more information.

11) Fuse

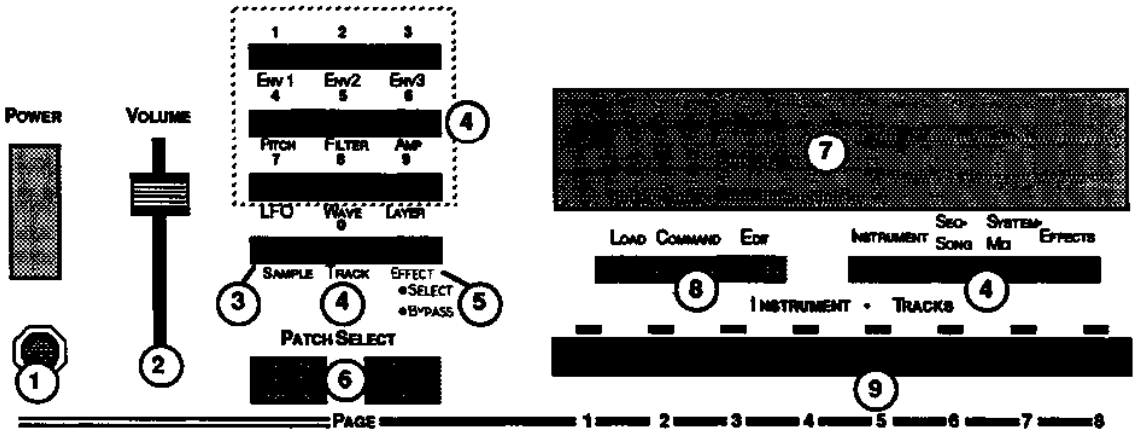
1 1/2 amp fast-blow fuse socket

12) AC Line In

The supplied line cord should be connected here. The correct voltage for the EPS-16 PLUS is listed on the Serial Number label on the rear panel. If you travel, remember that the EPS-16 PLUS will only operate on this voltage.

The Front Panel — Communicating with the EPS-16 PLUS

Almost everything you do on the EPS-16 PLUS — whether it's selecting a sound, editing that sound, adjusting the tuning, etc. — is controlled from the front panel using the following controls:



1) Headphone Jack

This headphone jack is for private listening. What you will hear are the signals at the Left and Right outputs (no signals from the Auxiliary Outputs). The audio outputs are not disabled when headphones are used.

2) Volume Slider

This controls the overall volume of all the EPS-16 PLUS' audio outputs.

3) Sample

This button is used to initiate sampling (digitally recording sounds) by the EPS-16 PLUS. See *Section 5—Sampling* for more on sampling.

4) Page Buttons

Within each mode, the available disk files, commands, and parameters are organized into *Pages*. A page is selected by pressing one of these fourteen page buttons. Once you are on the correct page, you use the data entry controls to scroll through the files, commands or parameters on the page. A given page will have different functions depending on the current mode. Each mode has a different set of pages available. Not all fourteen page buttons are active in all three modes.

The ten *numbered* page buttons also double as a numeric keypad for "direct-dialing" a given disk file (see Parameter Illustrations later in this section), command, or parameter or for sending MIDI Program Changes.

5) Effect Select•Bypass

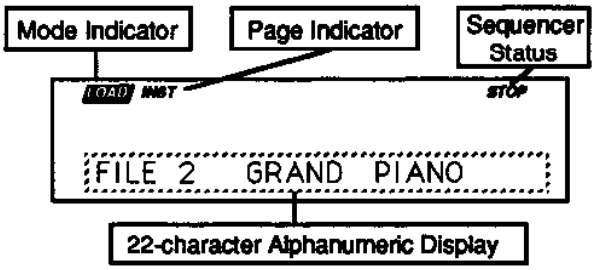
This button acts as the "master" controlling switch for the built-in effects, determining which, if any effect will be used and how it will interact with the instruments that reside in the internal memory. The controls on this page also determine the playback rate and polyphony. See *Section 4—Effects* for more details.

6) Patch Selects

These two buttons can be programmed to provide instant access to up to four completely different sounds within each Instrument The alternate sound might be a different set of samples, or the same samples with different envelopes, or a chorused version of the sound, or perhaps a different range of an instrument. There are two parameters of the EDIT/System•MIDI page which allow the optional SW-5 Dual Foot switch to reproduce the action of these buttons. See *Section 2 —System Control,* for more information.

7) Display

The EPS-16 PLUS Display is divided into two main sections: the *Indicator Lights* in the top half of the window, and the *22-character alphanumeric display* at the bottom of the window.



The indicator lights will tell you which mode the EPS-16 PLUS is in (LOAD, COMMAND, or EDIT); which page it is on; and the sequencer status (STOP, PLAY, RECORD, etc.). The 22-character alphanumeric display is used to show you information about specific files, parameters, commands, etc. It will also ask you for additional input when necessary, such as which track you want to load an instrument into, or which Wavesample you want to edit.

8) Mode Buttons

These three buttons are the key to finding your way around the EPS-16 PLUS. The EPS-16 PLUS is *always* in one of these three *Modes* — LOAD, COMMAND, or EDIT, The current mode is selected by pressing the appropriate mode button. The highlighted word in the upper left corner of the display tells you which is the current mode.

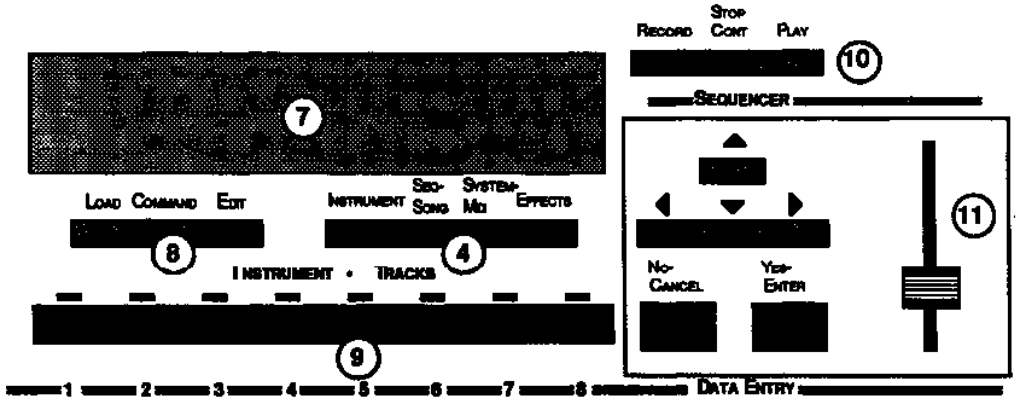
- LOAD mode is the one you will be in most often — since the EPS-16 PLUS lets you continue playing while loading sounds and sequences, LOAD mode also doubles as the "Performance" mode.
- COMMAND mode is used to execute a wide variety of commands, such as: saving instruments, banks, and sequences to disk; copying instruments, layers, and Wavesamples from one internal location to another, creating and modifying sequences and songs; and manipulating Wavesamples and their loops in various ways... just to name a few.
- EDIT mode is used to select and modify a great many variables — or parameters — ranging from the volume of a Wavesample, to the velocity response of the instrument, to the MIDI In mode. EDIT mode is also the mode in which all sequence recording and mixing is done.

9) Instrument•Track Buttons

These eight buttons are used to select, de-select, and "stack" the various instruments loaded into the internal memory of the EPS-16 PLUS. For each of the eight locations, the LED above the button indicates whether an instrument is *Loaded* into that location (LED shows red) and whether it is *Selected* (LED shows yellow). See "Playing Instruments," later in this section for a full discussion of the Instrument•Track buttons.

Each instrument location is also a sequencer track — that is, whatever is recorded on track 1 of a sequence will play the instrument that is loaded into location #1. When you are recording, editing or mixing sequences and songs, you use these buttons to select the current track.

Additional Front Panel Controls



10) Sequencer "Transport Controls"

These three buttons are used to control the EPS-16 PLUS' built-in multi-track Sequencer. See *Section 8—Sequencer Basics,* for details.

11) Data Entry Controls

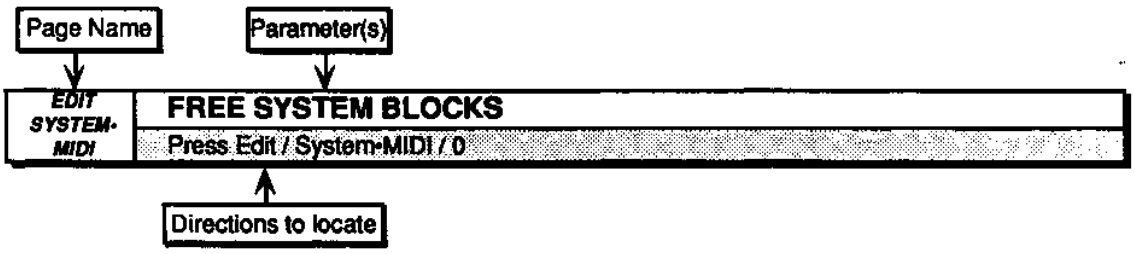
Once you are in the desired mode and have selected the proper page, you use the controls in the data entry section to: locate and load the desired file (in LOAD mode); locate and execute the desired command (in COMMAND mode); or locate and modify the value of the desired parameter (in EDIT mode).

- The *Data Entry Slider* and the *Up* and *Down Arrow* buttons will: move through the files on the current disk or directory (in LOAD mode); change the value of the current parameter (in EDIT mode); or respond when the EPS-16 PLUS asks you for further input during the execution of a command (in COMMAND mode).
- The *Left* and *Right Arrow* buttons are used primarily to move to the next parameter or command on the current page.
- The *Enter•Yes* and *Canel•No* buttons are used to either proceed with or cancel the function currently showing on the display.

Parameter Illustrations

The EPS-16 PLUS accesses parameters and commands through *Pages*. Each page is accessed by two button presses, the first being a Mode button and the second a Page button. Most parameters will also have a *Direct-Dial Number*. This number can be pressed immediately after pressing the proper Mode and Page button to get to a specific parameter directly, bypassing scrolling with the *Left/Right Arrow* buttons.

When describing parameters or commands in this manual, parameter illustrations are used to communicate the location of the parameter and how to get there. For example:



These illustrations not only help to divide the manual into easy to locate sections for each screen, they also provide the following three important pieces of information about the parameter being discussed:

- **Page Name** — The page in which the parameter resides. In this case, it is the EDIT/System•MIDI page.
- **Parameter(s)** — This tells you the name of the parameter or parameters as they're listed in that screen. When a screen has more than one parameter, they are divided by a semi-colon (;).
- **Directions to Locate** — This tells you how to get to the parameter screen. The directions will contain the Direct-Dial Number for the parameter if one exists. If not, it will advise you to scroll to the parameter.

Parametric Programming

The method used to modify or edit programs, presets and system parameters is called *Page-driven Parametric Programming,* which sounds like a mouthful, but don't worry. Once you've grasped a few basic concepts you'll find that operating the EPS-16 PLUS is quite simple, given its many capabilities.

It is likely that you have already encountered some form of parametric programming on other synthesizers or samplers. What this means is that instead of having a separate knob or slider for each function, you have one master *Data Entry Slider,* and two arrow buttons, which adjust the value of whichever parameter you select

This approach has many advantages, the most obvious of which is that it greatly reduces the amount of hardware — knobs, switches, faders, etc. — needed to control a wide variety of functions. (If the EPS-16 PLUS had a separate control for each function, it would literally have hundreds of knobs.)

Loading and Playing Instruments and Banks

About Instruments

We refer to EPS-16 PLUS sounds as *Instruments.* A grand piano, an electric bass, a multi-sampled drum set, a complete string section — each of these would be an example of an instrument. You can load up to eight instruments into the EPS-16 PLUS, memory permitting, and have instant access to any or all of them.

Each instrument contains four different *Patches* which are selected with the *Patch Select* buttons. These patches allow a single instrument to have four different inflections, voicings, tunings, or synth-type program variations all available at the press of a button.

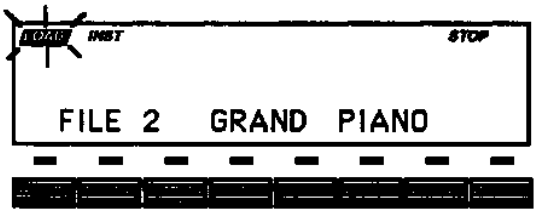
An instrument can be any size (within the limits of memory) — one instrument might consist of a single Wavesample that plays over the entire keyboard, while another might have as many 127 different Wavesamples.

For sequencing remote devices, you can create an instrument which has no samples at all, and assign it to play *only* out MIDI, on a particular MIDI Channel.

Loading an Instrument

You can load up to eight different instruments into the EPS-16 PLUS at once (within the limits of memory). First, insert a disk containing one or more instrument files into the disk drive.

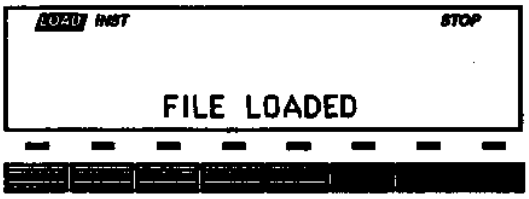
- Press *Load.* The LOAD indicator flashes.
- Press *Instrument.* The display looks like this:



When the LOAD indicator is flashing, the EPS-16 PLUS is showing you disk files (think of it as a question mark - the EPS-16 PLUS is saying "Load the file showing on the display?"). Pressing the *Up/Down Arrow* buttons takes you through the files on the disk. If there are none, the display will read "NO INSTRUMENTS."

Whenever a disk file is displayed as above, you can press the *Left* or *Right Arrow* button to see the size of that file in *Blocks* (a Block is 256 samples; 4 Blocks=lK samples). Press the *Left* or *Right Arrow* button again to return to the file name.

- Use the *Data Entry Slider* or the *Up/Down Arrow* buttons to view the various instrument files on the disk. Each file has its own File Number. When an instrument file is showing, the INST indicator is lit. The BANK Indicator will light when a bank file is showing (see later this section for more info on banks).
- Find the instrument you want to load, and press *Enter*. The display will say PICK INSTRUMENT BUTTON. The EPS-16 PLUS wants to know into which instrument location you wish to load the sound.
- Press any of the eight *Instrument•Track* buttons. The EPS-16 PLUS will begin immediately loading the instrument into the selected location. The display reads LOADING FILE... and the *LED flashes* red while the instrument is being loaded.



Once the instrument has been loaded, the display briefly shows "FILE LOADED." The LED above the instrument stops flashing and remains solidly lit red, indicating that there is now an instrument in that location which can be selected by pressing that button.

If you tell the EPS-16 PLUS to load an instrument into a location which already has an instrument loaded (red LED), the new instrument will be loaded into that location and the one that was there will be automatically deleted.

- You might have to delete an instrument(s) before loading the new one. If there are already one or more instruments loaded into the EPS-16 PLUS, there might not be enough free memory to load the new one. In this case, the display will say PICK INST TO DELETE. At this point you have three choices. You can:
  1. Press any loaded *Instrument•Track* button. That instrument will be deleted from memory and the new one will be loaded; or
  2. Press *Enter•Yes.* The EPS-16 PLUS will delete an instrument (or Instruments, as needed) for you, starting from the *highest-numbered* one in memory; or
  3. Press *Cancel•No.* The load command will be canceled with no harm done.

Note: You can continue to select and play existing instruments while the new one loads; No more "down-time" waiting for the next sound to load, with the EPS-16 PLUS, you can be loading the next sound you need while continuing to play the currently selected sound.

Deleting an Instrument from the Internal Memory

Sometimes you will want to delete an instrument from memory — to free up some memory for sampling, for instance. Make sure you have saved the instrument to disk before deleting it (see *Section 11 —Storage* for details on saving instruments, banks, and sequences).

- Verify that the instrument you want to delete is selected.
- Press *Command,* then *Instrument.*
- Press the *Right Arrow* button repeatedly until the display reads DELETE INSTRUMENT.
- Press *Enter•Yes.* The display asks DELETE <INST NAME>?
- Press *Enter•Yes.* (Or press *Cancel•No* to abort the procedure.)

Hint: There is a "shortcut" method for deleting an instrument from internal memory. First, press the *Instrument•Track* button of the instrument you would like to delete. Then, *while continuing to hold the Instrument•Track button down,* press the *Cancel•No* button.

About Banks

Banks provide a way to load a whole group of instruments and sequences into the EPS-16 PLUS with a few button presses. When you save a bank to disk, it is like taking a "snapshot" of the contents of the EPS-16 PLUS Internal memory — the EPS-16 PLUS stores in the bank file information about which instruments are loaded into which of the eight Instrument•Track locations, and the current song and sequences (if any). When you load a bank, the EPS-16 PLUS will reproduce the same state by loading those instruments into the same locations and, if you choose, loading the song with its related sequences. A bank will also save any Performance Presets you have created (see *Section 3 —Instruments and Banks* for more details).

For example, you might have a piano loaded into instrument #1, a bass in instrument #2, and drums in instrument #3, and you have created a number of Performance Presets containing different keyboard configurations of those instruments. Let's say you also have in memory a song, which is composed of 12 sequences. If you now save the contents of memory as a bank, you can later. call up this exact setup by loading the bank.

The bank file on a disk doesn't contain the actual instrument and sequence files — it is just a set of instructions telling the EPS-16 PLUS what to load and where. All the instruments and the song in a bank must be saved to disk individually prior saving the bank. Any instruments already loaded into locations not affected by the bank will be left intact (memory permitting). You can select and play such instruments while the bank loads.

To Load a Bank

- Press ***Load,* then *Instrument.***
- **Use the *Up/Down Arrow* butt**ons to view the different files.



When a bank file is showing, the BANK indicator lights on the display along with the INST indicator.

- Once a bank file is showing, press *Enter•Yes.* The EPS-16 PLUS will begin loading the instruments and the song data. As it loads each instrument the display tells you what it's doing. As soon as any of the instruments is finished loading you can select that instrument and play while the rest of the bank loads.

At some point in the loading process, you may encounter the following message:



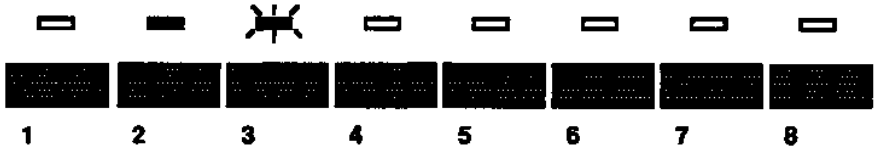
This prompt is informing you that an instrument or song saved as part of the bank is on a different disk than the disk currently in the drive. When this occurs:

- Eject the current disk in the disk drive and replace it with the disk that matches the Disk Label ID requested by the EPS-16 PLUS (you are writing these names on your disks, aren't you?). For more information on Disk Label identification see *Section 2 — System Control* and *Section 11 — Storage.*
- Press *Enter•Yes.* The EPS-16 PLUS will resume loading until completed, or until the point when it needs another disk.
- When it has finished loading the instruments, the EPS-16 PLUS will load the song (if any) and then set up any copied instruments included in the bank.

Playing Instruments

- First, press *Load* to make sure you are in LOAD Mode.

Now well look at the eight Instrument•Track buttons and how they function in LOAD Mode.

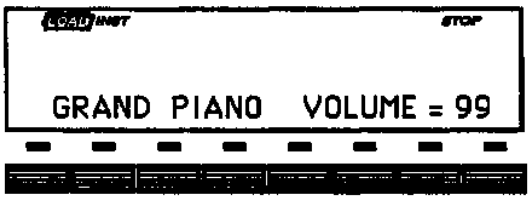


Instrument•Track Buttons

Each of these buttons represents a location or "slot" into which an instrument can be loaded The LED above each button tells you whether there is an instrument loaded into that location, and whether it's selected, de-selected or "Stacked"

- The LED lights *Red* to indicate that an instrument is loaded into that location, and can be selected by pressing that button. If none of the LEDs are lit, no instruments are loaded. (The *LED flashes* red while an instrument is being loaded from disk.)
- The LED lights *Yellow* when the instrument is selected (i.e. active from a keyboard). You select an instrument by pressing its instrument button. Pressing the button a second time "de-selects" the instrument, changing the yellow LED back to red. (If none of the LEDs are yellow, that means that no instruments arc selected, and playing from a keyboard won't make any sound.)
- The *LED flashes Yellow* when the instrument is "Stacked" with one or more instruments. An instrument which is stacked will play simultaneously with any other instruments which arc selected or stacked You stack an instrument by pressing its button *twice in rapid succession* (or "double-click" on the instrument button, to borrow a term from those computers which use a "mouse"). You will hear both instruments when you play the keyboard (wherever their keyboard ranges overlap, that is).

- Select a loaded instrument (one whose LED is red) by pressing its *Instrument•Track* button. The display now looks like this:



Once you have loaded one or more instruments, select the instrument you want to play by pressing the appropriate *Instrument•Track* button. The LOAD indicator stops flashing, and the EPS-16 PLUS shows you the name of the selected instrument, and its volume setting.

You can adjust the volume of the instrument with the *Data Entry Slider* or the *Up/Down Arrow* buttons. This lets you easily balance the levels of several instruments when splitting the keyboard or stacking sounds. If any other instruments are loaded, you can select them in the same way, and adjust their volumes. Each time you select an instrument, its name and volume setting will appear in the display.

- Try selecting different instruments. Try "double-clicking" to stack instruments. Click once on a selected or stacked instrument to de-select it

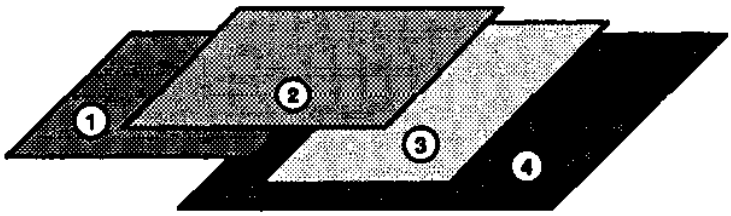
- Pressing the *Load* button again returns you to viewing disk files (LOAD flashing). You can also press *Cancel* to toggle back and forth between looking at disk files (LOAD flashing) and looking at instruments in the internal memory (LOAD indicator lit but not flashing).

Keyboard Range (How Instruments Share the Keyboard in LOAD Mode)

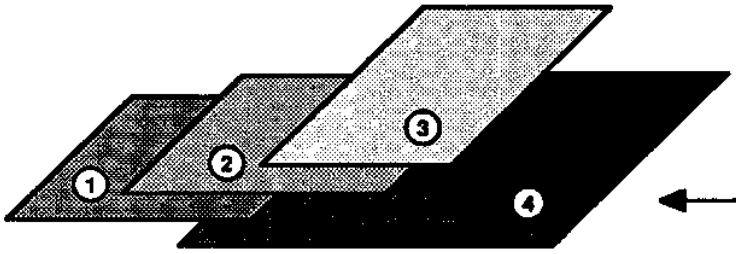
Whenever the EPS-16 PLUS is in LOAD Mode (which is the normal performance mode) you arc not limited to one instrument on the keyboard at a time (or two, or three for that matter). Each instrument has a *Keyboard Range,* which is the section of the keyboard that it will respond to when selected.

The range of an instrument can be as much as the full 127 keys of the MIDI Spec or as little as a single key. Up to eight instruments can inhabit the keyboard in a way that might be termed a "Pile of Instruments."

Imagine four pieces of paper, each a different size, piled on top of each other:

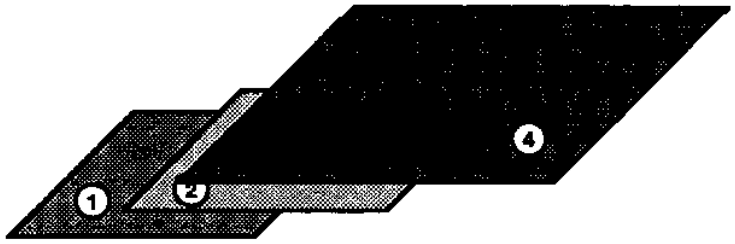


In the picture above, sheet #2 is on top of the pile — all of it is showing. The other three sheets are partially covered up. Now suppose we could magically bring sheet #3 up to the top of the pile. The pile would look like this:



Now all of #3 is showing: Numbers 1,2 and 4 are partially showing, partially covered up.

If we now bring #4 to the top of the pile, Numbers 1 and 2 are still partially visible, but #3 is covered up completely.



Instruments loaded into the EPS-16 PLUS when in LOAD mode act similarly.

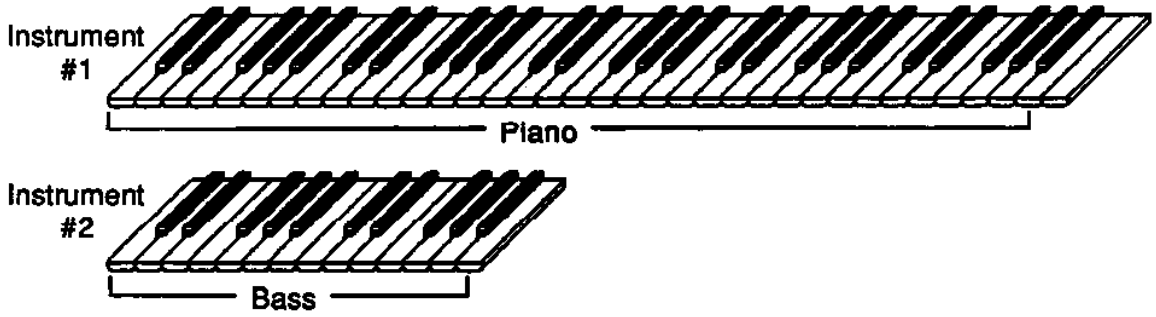
Whenever you select an instrument, it is *brought to the top of the pile*. That is, you will hear the most recently selected instrument over its whole range when you play from a keyboard. Any previously selected or stacked instruments will be "covered up" wherever their ranges overlap with that of the newly selected one.

Wherever an instrument is not "covered up," it will continue to play from a keyboard. So you can see that "splitting" the keyboard is as easy as selecting two or more instruments with different (or overlapping) ranges.

- All instruments which are selected (LED lit yellow) are "on the pile," even if they are partially covered up by another instrument

Now let's try the sheets-of-paper analogy in terms of instruments on a keyboard. Suppose you have two instruments loaded into the EPS-16 PLUS:
- Instrument #1 is a piano sound, whose range is the entire keyboard;
- Instrument #2 is a bass sound, whose range is only the bottom two octaves.

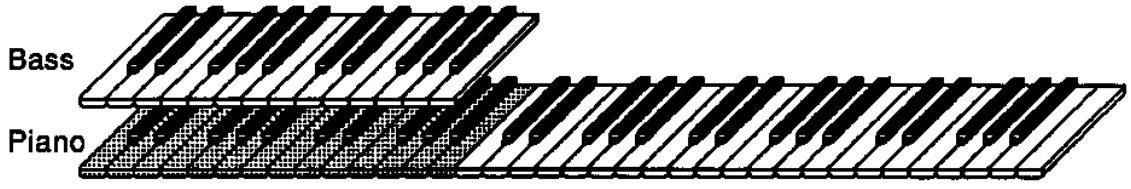
The ranges of the two instruments can be shown like this:



If you select the piano, it will play over the whole keyboard, covering up the bass entirely:



Now you select the bass. This brings it to the top of the pile, and it covers up the piano, but only in the region where their ranges overlap (the bottom two octaves):



If you play now, you will hear the bass in the bottom two octaves and the Piano over the rest of the keyboard. If you de-select the bass (by pressing its instrument button again) its LED goes from yellow back to red and it returns the whole keyboard range to the piano.

This same logic applies no matter how many instruments are loaded and selected. Whichever one you select comes to the "top of the pile."

Important: The "Pile" described here only exists in LOAD Mode. In EDIT and COMMAND modes, only one instrument can ever be selected at a time.

Additional Notes:

- Whenever a selected instrument is covered up completely by the selection of another, its LED changes from yellow back to red—it is automatically de-selected.
- Up to all eight instruments can be selected and can play on some part of the keyboard at once, as long as none is covered up completely. Also, up to all eight instruments can be stacked at once.
- Instruments which you "stack" by double-clicking their instrument buttons will play simultaneously with whatever other instruments are on the pile. Selecting another instrument, however, will bring that instrument to the top, covering up any stacked instruments as well as any selected ones.
- You can reset any instruments key range. This is done on the EDIT/Pitch page. See *Section 7—Voice Parameters* for details.

Available Accessories

These optional accessories are available from your ENSONIQ dealer:

- **ENSONIQ Model SW-5 Foot Switch** — For voice sustain, sostenuto, patch select or starting and stopping the sequencer.

- **Model CVP-1 CV PEDAL** — A *Control Voltage Foot Pedal* which can be assigned as a modulator within the voice section of the EPS-16 PLUS or used as a volume pedal.

- **SL, SLT, and ESS Sound Libraries** — The EPS-16 PLUS has an extensive and ever-growing collection of the most accurate, responsive, and musical sampled sounds available anywhere. These sounds are divided into three separate libraries: SL, a series of five-disk sets featuring the latest sounds specifically designed for the EPS-16 PLUS; SLT, a series of ten-disk packs originally designed by top sound programmers for the EPS, but compatible with the EPS-16 PLUS; and ESS, three-disk "Signature Series" sets designed by renowned industry performers and producers like Nile Rodgers, Craig Anderton, John Robinson, David Hentschel, and others.

- **FB-1 and FB-2 FLASHBANKS** — FLASHBANKS are a semi-permanent storage medium for EPS-16 PLUS instrument files. Any instruments saved to the FLASHBANK can be instantly loaded and will occupy NO blocks of internal memory. Another nice feature of the FLASHBANK is that instruments that are saved to it will remain in memory even when the EPS-16 PLUS is powered down. What this means is that as soon as you power up, the instruments in the FLASHBANK are ready to use. The FB-1 provides 512k of memory (1024 blocks), FB-2 provides 1 Megabyte (2048 blocks).

- **SP-2 SCSI Kit** — This SCSI (Small Computer System Interface) kit allows the EPS-16 PLUS to communicate with a hard drive, CD ROM player, or computer. Hard drives provide a faster, more convenient way to store instrument, sequencer, bank, and MIDI files. The SP-2 *must* be installed by an Authorized ENSONIQ Repair Station.

An Important Note About EPS-16 PLUS SCSI Connections

ENSONIQ highly recommends that users who wish to add SCSI to their EPS-16 PLUS' use ENSONIQ-made accessories. However, for those wish to purchase a third-party SCSI kits, there are some important things to know about third-party SCSI kits and your EPS-16 PLUS' warranty:

- ENSONIQ will not approve any third-party SCSI kits for the EPS-16 PLUS.
- The use of non-approved third-party products voids the ENSONIQ warranty. Any third-party product which requires opening the case must be installed by an Authorized ENSONIQ Repair Station.

Need More Help?

Whether you're an aspiring programmer looking for additional information about basic sampling techniques and MIDI theory, or a professional sound designer working with advanced applications, you may want more detailed information that is beyond the scope of this manual. The following books can help enhance your understanding of synthesis, MIDI, and related topics. These, in addition to the numerous monthly magazines, provide a wealth of information. While we don't endorse any one of these publications, we offer this partial list as a resource for you to draw on.

Alexander Publishing
For prices and additional information call: 1-800-633-1123

MIDI

1989—HOW MIDI WORKS, Dan Walker
MURPHY'S LAW MIDI BOOK, Jeff Burger

SAMPLING

THE EPS SAMPLING BOOK, Bob Maestas
SAMPLING BASICS, Bob Maestas

SEQUENCING

SEQUENCING AND ARRANGING Vol's 1-4, Joesph Wagner

SYNTHESIZERS

RECORDING, SYNCING & SYNTHS, Paul Goldfield
TEACH YOURSELF KEYBOARD PLAYING & IMPROVISING, Vol's I &2,Dr. Jack Wheaton

The Mix Bookshelf
For prices and more information call: 1-800-233-9604
In California call: 1-800-641-3349

MIDI

MIDI FOR MUSICIANS, Craig Anderton
MUSIC THROUGH MIDI, Michael Boom
THE MIDI HOME STUDIO, Howard Massey
THE MIDI BOOK, Steve De Furia
MIDI RESOURCE, Steve De Furia
MIDI IMPLEMENTATION BOOK, Steve De Furia
THE MIDI SYSTEM EXCLUSIVE BOOK, Steve De Furia
USING MIDI, Helen Casabona, David Frederick
MIDI, THE INS, OUTS AND THRUS, Jeff Rona

SAMPLING

THE SAMPLING BOOK, Steve De Furia, Joe Scacciaferro

SYNTHESIZERS

GUITAR SYNTH & MIDI, Guitar Player Magazine
SECRETS OF ANALOG AND DIGITAL SYNTHESIS, Steve De Furia
BEGINNING SYNTHESIZER, Helen Casabona, David Frederick
THE NEW COMPLETE SYNTHESIZER, David Crombie
SYNTHESIZER BASICS, Dean Friedman
THE KEYBOARD SYNTHESIZER LIBRARY, Keyboard Magazine
A SYNTHESIST'S GUIDE TO ACOUSTIC INSTRUMENTS, Howard Massey

GPI Books
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SYNTHESIZERS AND COMPUTERS (REVISED)
SYNTHESIZER BASICS (REVISED)
SYNTHESIZER PROGRAMMING
SYNTHESIZER TECHNIQUE (REVISED)

Section 2 — System and MIDI Control

These parameters control instrument-wide system functions.

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EDIT/System•MIDI Page

This page contains system (or global) and MIDI parameters.

Note: Due to the large number of parameters on this page, not all parameters have a direct-dial number. Those that do will have that number listed in its parameter illustration. Parameters without direct dial numbers can be accessed by using the *Left/Right Arrow* buttons.

System Parameters

These parameters are among those which will be saved to the O.S. disk when you SAVE GLOBAL PARAMETERS (see later in this section).



This page shows the amount of available internal memory (in blocks).



This page shows the amount of available memory (in blocks) on the disk currently in the drive (or on the hard disk if a SCSI device is selected as the storage device).



Adjusts the overall master tuning of the keyboard up or down as much as one semitone. A value of +00 will set the EPS-16 PLUS to concert A=440 tuning.

Range: -99 to +99 cents



Use this parameter to adjust the pitch bend range. The bend range is adjustable in one-semitone increments from 0 to 12. Each EPS-16 PLUS Wavesample can have its own bend range (which will override the global bend range) or can use this global bend range.

Range: 0 to 12 semitones



All Notes Off

This parameter determines whether the EPS-16 PLUS will respond to a MIDI All Notes Off command. All Notes Off is a MIDI mode message which turns off all voices turned on via MIDI at the time the message is received. It is not recognized when the EPS-16 PLUS is in OMNI mode.

- OFF — the EPS-16 PLUS will *not* recognize incoming All Notes Off messages.
- ON — the EPS-16 PLUS will recognize incoming All Notes Off messages.

With this in mind, the EPS-16 PLUS does not *transmit* an All Notes Off command (though it obviously "passes on" any such messages via its MIDI Thru jack).



The optional CV Pedal (model CVP-1) can be used as a volume pedal or as a modulator. The volume pedal is sent as MIDI controller #7. If PEDAL=MOD it will affect anything that has pedal selected as a modulator, and it will go out as MIDI controller #4.

Note: Some Yamaha® TX modules (depending on the software version) receive MIDI controller #4 as volume. If the pedal is not plugged in, MIDI controller #4 will default to 0, which will shut down volume of the TX.

- When set to PEDAL=VOLUME MIDI=7 the optional CV Pedal acts as a volume pedal.
- When set to PEDAL=MOD MIDI=4 the optional CV Pedal acts as a modulation pedal, and will cease to act as a volume pedal.

EDIT SYSTEM• MIDI

SUSTAIN FT SWITCH (Sustain/Patch Select)

Press Edit / System•MIDI / scroll using the arrow buttons

This page allows the sustain foot switch to act as a sustain pedal or a patch select button.

- When set to SUSTAIN FT SW=SUSTAIN the single SW-1 foot switch which comes with the unit, or the right-hand pedal on the optional SW-5 Dual Foot Switch acts as a sustain pedal.
- When set to SUSTAIN FT SW=PATCH SL the foot switch will reproduce the actions of the right-hand patch select button, and will cease to act as a sustain pedal.

EDIT SYSTEM• MIDI

AUX FT SWITCH (Start-Stop/Patch Select)

Press Edit / System•MIDI / scroll using the arrow buttons

This page allows the auxiliary Foot Switch (available only with the optional SW-5 Dual Foot Switch) to either start and stop the sequencer or to act as the left-hand patch select button. See *Section 1 — Getting Started* for more details.

- OFF — This setting makes the EPS-16 PLUS ignore the left footswitch. If you arc arc using the single footswitch (SW-1) which came with the EPS-16 PLUS, then you should keep this parameter set to OPT.
- When set to AUX FT SW=START/STOP, the left pedal of the SW-5 duplicates the action of the *Stop•Continue* button.
- When set to AUX FT SW=PATCH SEL, the left pedal duplicates the behavior of the left-hand patch select button and will cease to act as a sequencer start/stop pedal.

EDIT SYSTEM• MIDI

AUTO-LOOP FINDING (On/Off)

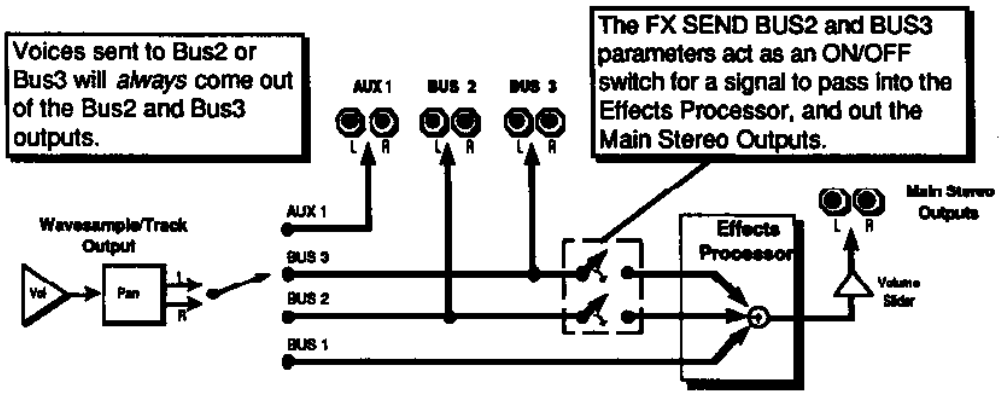
Press Edit / System•MIDI / 3

This parameter enables or disables the "Expert-System" auto-loop function. If the auto-loop function is enabled, the EPS-16 PLUS will automatically go to zero crossings (with matching wave direction) whenever you move the loop start or end pointer. This is a very useful feature because finding zero crossings is essential to creating glitch-free loops. If the auto-loop function is disabled, the loop start and end parameters will move in one-sample increments.

EDIT SYSTEM• MIDI	**FX SEND BUS2/3**
	Press Edit / System•MIDI 4

This parameter determines whether voices assigned to Bus 2 and Bus 3 on the EDIT/Amp or EDIT/Track page will be sent through the internal effects processor, ultimately coming out of the Left/Right Audio Outs, or will be sent exclusively to the auxiliary outputs of the EPS-16 PLUS.

- Setting these parameters to OFF provides the signal separation that will most likely be desired when using the additional outputs. If these parameters are left ON when using the additional outputs, the Dry portion of the signal sent to Bus 2 and Bus 3 would come out of the auxiliary outputs, while the signal with Effects would come out of the EPS-16 PLUS' Left/Right Audio Outs.
- These parameters should be set to ON when not using any auxiliary outputs, allowing you to use up to three effects busses.



As you can see from the diagram, the signal is sent to the auxiliary outputs *before* entering the signal processor. Therefore, the signals coming out of the auxiliary outputs are always dry (no effects).

MIDI Parameters

Few developments in recent years have had as great an impact on the way we make music as has the emergence of MIDI Whether you are simply linking two keyboards together, playing a synth from a guitar controller, or driving a rack of samplers from a drum pad controller, MIDI makes it all possible. The evolution of MIDI has facilitated the merging of existing technologies and has inspired the creation of new technologies. ENSONIQ has always been an industry leader in MIDI development, and the EPS-16 PLUS embodies the latest advances in a state-of-the-art sequencer, controller keyboard, and multi-timbral sound generator.

The following parameters control the global MIDI set-up of the EPS-16 PLUS and will also be saved to the O.S. disk when you SAVE GLOBAL PARAMETERS (see (X>MMAND/System•MIDI page later in this section).



Here you can select the Base Channel on which the EPS-16 PLUS transmits and receives MIDI messages. The base channel is used to receive MIDI data while the EPS-16 PLUS is in POLY and MONO A modes. When working within a sequence or bank (with TRANSMIT ON=INST CHAN), the EPS-16 PLUS transmits and receives MIDI data on the individual track channels. System Exclusive messages are always sent and received on the base channel.

Any of 16 MIDI channels may be selected as the base MIDI channel of the EPS-16 PLUS. The effect of setting the base channel varies depending on the setting of the TRANSMIT ON= parameter, the MIDI Mode and whether data is being transmitted or received.

Receive In POLY mode, keys, controllers, and program changes are only recognized if received on the base channel. In MONO A mode, program changes are received only on the base channel. The base channel is also used in MONO A mode as the first channel of the 8 channel range.

Transmit The EPS-16 PLUS has two different MIDI transmitting schemes, depending on the setting of the TRANSMIT ON= parameter. When TRANSMIT ON=BASE CHAN, the EPS-16 PLUS always transmits only on the base channel. When TRANSMIT ON=DEST CHAN, the EPS-16 PLUS always transmits on the individual track channel.

Range: MIDI channels 1 through 16.

EDIT SYSTEM•MIDI **TRANSMIT ON (Instrument Channel/Base Channel)**

Press Edit / System•MIDI / 6

- When set to INST CHAN, each of the eight EPS-16 PLUS instruments will send on its own MIDI channel (or not at all, if assigned LOCAL status). Each instrument will have its own MIDI program number and its own PRESSURE setting.

  When TRANSMIT ON=INST CHAN and the MIDI IN MODE=POLY, the EPS-16 PLUS goes into Smart Transmit mode and will retransmit incoming single channel MIDI data multi-timbrally over up to eight independent MIDI channels, based on the parameter settings on the EDIT/Instrument page. See "Smart Transmit" in *Section 3 —Instruments and Banks* for complete details.

- When set to BASE CHAN, the EPS-16 PLUS will always transmit notes, controllers and program changes on the Base MIDI channel and *only* on that channel, no matter what instruments are selected from the front panel.

EDIT SYSTEM•MIDI **BASE CHANNEL PRESSURE**

Press Edit / System•MIDI / scroll using the arrow buttons

This parameter has no effect on the EPS-16 PLUS rack-mount unit. It is utilized by the keyboard version of the EPS-16 PLUS, which uses the same operating system.

EDIT SYSTEM•MIDI **MIDI IN MODE**

Press Edit / System•MIDI / 7

This parameter determines how MIDI information will be *received* by the EPS-16 PLUS and its various Instruments. MIDI In Mode has no effect on what MIDI information is sent
There are five MIDI modes implemented in the EPS-16 PLUS:

- OMNI — In this mode the EPS-16 PLUS will receive on all 16 MIDI channels. This mode is useful when you are only using a few instruments, and you are not concerned with setting up different channels for each device.
- POLY — In this mode the EPS-16 PLUS will receive only on the Base MIDI channel. MIDI information on all other channels will be ignored.
- MULTI — An ENSONIQ innovation, MULTI mode is the key to unlocking the potential of the EPS-16 PLUS as a multi-timbral receiver from an external MIDI sequencer. In MULTI mode the 8 tracks of the current song or sequence or 8 individual instruments can receive MIDI information independently and polyphonically on up to 8 different MIDI channels.

Different MIDI channels should be selected for each track which you want to receive. This can be accomplished on the EDIT/Track (see *Section 3 —Instruments and Banks* for more information).

In MULTI mode, independent of what sounds are selected on the front panel, the sounds you hear will depend entirely on what MIDI channel(s) the MIDI data is received on.

MONO Mode

MONO mode is particularly useful for driving the EPS-16 PLUS from a guitar controller, or any other application where having up to eight independent, monophonic channels is desirable.

The EPS-16 PLUS offers two types of MONO mode operation. In both types, the EPS-16 PLUS will receive monophonically on eight consecutive MIDI channels starting with the Base channel (the base channel through base channel +7). The difference has to do with how those MIDI channels are routed within the EPS-16 PLUS.

- MONO A — This is another ENSONIQ development intended to make using multi-channel controllers like guitars easier. All notes and controllers received will play whatever instruments are selected for the note that is played You have the advantage of multiple tracks which will respond independently to controllers received on multiple channels, but you do not have to set up the instruments for each track separately.
- MONOB — This is the more conventional type of MONO mode. It allows you to set up each track of the EPS-16 PLUS as a monophonic synthesizer. This is the only way to get a different sound on each string when using a MIDI guitar controller.

Global Controllers in MONO Mode

Global controllers are controllers sent on one channel which affect all other channels simultaneously. They can be useful in reducing the number of MIDI events required to achieve particular effects, and can thereby reduce the delays sometimes associated with overloading MIDI. Some guitar controllers can transmit global controllers, and the EPS-16 PLUS can respond to them.

In MONO mode (A or B) the base channel minus one becomes the MIDI channel for global controllers (pitch bend, pressure, etc.). For example, if the base channel is channel 3, any controllers received on channel 2 will be interpreted as global controllers and will affect *all* voices being played. If the base channel is channel 1, channel 16 becomes the channel for global controllers. Each track will also respond independently to controllers sent on its own channel. For example, each guitar string on a MIDI guitar can send independent pitch bend, while the "whammy bar" controller could be sent on the global channel to affect all voices.

EDIT SYSTEM•MIDI **MIDI CONTROLLERS (On/Off)**

Press Edit / System•MIDI / scroll using the arrow buttons

This determines whether the EPS-16 PLUS will send and receive MIDI controllers—pitch bend, mod wheel, pressure, volume, sustain, etc. When Off, the EPS-16 PLUS will neither transmit nor receive MIDI controllers.

EDIT SYSTEM•MIDI **MIDI SYS-EX (On/Off)**

Press Edit / System•MIDI / scroll using the arrow buttons

This parameter determines whether the EPS-16 PLUS will send and receives MIDI System Exclusive messages, such as remote programming instructions or Wavesample dumps. When OFF, the EPS-16 PLUS will neither transmit nor receive System Exclusive messages.

Note: This parameter does not have to be on for the EPS-16 PLUS to record and store Sys-Ex messages from external devices using its MIDI Sys-Ex recorder function on the COMMAND/System•MIDI page.

EDIT SYSTEM•MIDI **MIDI PROG CHANGE (On/Off)**

Press Edit / System•MIDI / 8

This parameter enables (ON) or disables (OFF) the EPS-16 PLUS to receive program changes over MIDI (the default is ON).

To Send a Program Change from the EPS-16 PLUS:

- Hold down an *Instrument•Track* button.
- *While holding down the Instrument•Track button*, "type in" the number (from 1-128) of the desired program change on the numeric keypad buttons of the EPS-16 PLUS; then
- Release the *Instrument•Track* button. When the button is released, the program change is sent.

If the EPS-16 PLUS has been set to TRANSMIT ON= INST CHAN, the program change will be sent on the MIDI channel of the instrument whose button you held down while typing in the number. If it is set to TRANSMIT ON= BASE CHAN, the program change will always be sent on the base channel.

Receiving Program Changes

What the EPS-16 PLUS does when it receives a program change depends on the current MIDI IN MODE.

If the MIDI IN MODE = OMNI, POLY, or MONO A, incoming program changes 1-24 will *Select, Deselect,* or *Stack* the eight Instrument•Tracks of the EPS-16 PLUS in the following fashion:

- Program changes 1-8 will *Select* EPS-16 PLUS Instruments 1-8 (LED will turn yellow), if received by an instrument which is not selected.

- Program changes 1-8 will *Deselect* Instruments 1-8 (yellow LED will return to red), if received by an instrument which is already selected.
- Program changes 9-16 will *Stack* Instruments 1-8 (yellow LED will flash).
- Also, program changes 17-24 will select Performance Presets 1-8 (see *Section 3—Instruments and Banks).*

If the MIDI IN MODE = MULTI or MONO B, incoming program changes are used to load instruments into Instrument•Track locations and to enter and exit directories. To load a given file into an Instrument•Track location you send the EPS-16 PLUS a program change which is the file number +1. When a program change is received, the EPS-16 PLUS will load the appropriate file from the currently selected storage device (FLOPPY, SCSI 1-7, or FLASH).

Note: Program change 1 has a special function, which is to EXIT TO the previous directory. This is particularly useful for moving around a SCSI Hard Drive from a remote device.



When this is ON, a remote sequencer or drum machine can be instructed to select a new song whenever you load a new song into the EPS-16 PLUS (the default is ON).

Whenever there is a song in memory, MIDI song select numbers can be assigned as follows:

- Press *Command,* then *Seq•Song.* Scroll to SEQUENCER INFORMATION.
- Press *Enter•Yes.* The display reads MIDI SONG SELECT=##.
- Select MIDI song numbers 0 through 127. When set to 0 this parameter is effectively turned off.



Each MIDI controller on a synthesizer or sampler (breath controller, mod wheel or pressure, for example) has a standardized MIDI number which is the number you select to make a particular controller affect the Wavesample parameters which can be modulated. One of the modulators that can be selected to modulate Wavesample pitch, volume, filter frequency, etc. is XCTRL (external controller).

Suppose you are driving the EPS-16 PLUS from a keyboard with a breath controller. You can set up a Wavesample on the EPS-16 PLUS where the filter cutoff frequency, or some other manual level, is modulated by XCTRL. Then assign this parameter a value of XCTRL= 02. The breath controller will now modulate the filter, or whatever, on this Wavesample. The chart below lists the accepted MIDI controller numbers.

The following controller numbers have been agreed upon:

No.	Controller	No.	Controller
1	Modulation wheel	66	Sostenuto pedal
2	Breath controller	70	Patch selects
4	Foot pedal controller	92	Tremolo Depth
6	Data Entry Slider	93	Chorus Depth
7	Volume	94	Celeste (Detune)
64	Sustain pedal	95	Phaser Depth

Though the range of this control is from 0 to 127, most of the values other than those listed above have no accepted function yet They are there to accommodate future MIDI standards.



This parameter determines whether local controllers (such as the patch select buttons, volume pedal, etc.) will affect all tracks or only the selected track(s). Setting this to ON is useful if you are playing the EPS-16 PLUS from an external drum pad or guitar controller in MULTI or MONO modes and want local controllers to affect all the tracks.

- ON — Local controllers will affect all Instruments/Tracks when the EPS-16 PLUS is in MULTI, MONO A or MONO B modes.
- OFF — Local controllers will affect only the Instruments selected or layered from the front panel, no matter what is being received via MIDI.

COMMAND/System•MIDI Page

Due to the large number of commands on this page, not all commands have a direct-dial number. Those that do will have that number listed in its command illustration. Commands without direct dial numbers can be accessed by scrolling using the *Left/Right Arrow* buttons.



Before you can save EPS-16 PLUS instruments or sequences to a disk it must be formatted. You can use a blank disk or one that was previously formatted by a different device, such as a computer. Formatting will completely erase anything on the disk.

- Insert the disk to be formatted into the drive.
- Select FORMAT FLOPPY DISK.
- Press *Enter•Yes.* The display will read DISK LABEL=DISK000
  Use the data slider and the arrow buttons to give the disk a unique name by which you can identify that disk. This is very *important*, as the EPS-16 PLUS will ask you for this disk by name if an instrument or song on the disk is used in a bank. Also, make sure you write the Disk Label name on the outside of each disk after you are done formatting it. After assigning a Disk Label, you can change the default prompt from DISK000 to the last label you assigned by using the "SAVE GLOBAL PARAMETERS" command (discussed later in this section). In doing this, you can ensure that all of your personal disks will have the same first four characters.
- Press *Enter•Yes.*
  The display will read ERASE AND FORMAT DISK?
- Press *Enter•Yes.*

While the disk is being formatted, the display reads FORMATTING... Formatting takes about 80 seconds per disk. When it's done the display says FORMAT COMPLETE. If the format fails, the display will read FORMAT FAILED. Try again with a different disk.

Note: After formatting a disk you can, if you want, copy the EPS-16 PLUS Operating System (O.S.) onto that disk (see below). Having the O.S. on your sound disks can be convenient — some advanced operations require the EPS-16 PLUS to load part of the O.S. from disk before proceeding. If the disk in the drive is not an O.S. disk, the EPS-16 PLUS will ask you to insert one. However, putting the O.S. on a disk leaves a little less space (about 160 Blocks less) for saving instruments and sequences.

CMD SYSTEM• MIDI

COPY O.S. TO DISK

Press Command / System•MIDI / 1

Use this command to put the EPS-16 PLUS Operating System (O.S.) on a new disk which you have formatted or to update the Operating System on an existing disk with a newer version.

Note: You cannot copy the Operating System to a disk onto which you have already saved instruments or sequences. Attempts to do so will result in an error message.

This procedure requires erasing the EPS-16 PLUS' Internal Memory, so save any important data before proceeding. Also, you'll need a disk containing the Operating System which you want to copy.

- Insert the disk containing the O.S. you want to copy (the source disk) into the drive.
- Select COPY OS TO DISK.
- Press *Enter•Yes.*
  The display says MUST ERASE MEMORY, OK? If you need to save any sounds or sequences, press *Cancel•No* and save the data before proceeding.
- Press *Enter•Yes.*
  The display says INSERT MASTER OS DISK. Make sure the write-protected source O.S. disk is in the drive.
- Press *Enter•Yes.*
  The display says READING OS INTO MEMORY, and then INSERT FORMATTED DISK.
- Insert the non write-protected disk onto which you want copy the O.S. (the destination disk) into the drive.
- Press *Enter•Yes.*
  The display reads WRITING OS TO DISK while the O.S. is being copied to the disk.

When it's done, the display reads COPY OS DONE. ANOTHER? If you want to copy the same O.S. to another disk, insert another formatted disk and press *Enter•Yes.* You can repeat this procedure as many times as you like. This makes it easy to update all your O.S. disks when a new EPS-16 PLUS Operating System is released.

- When you are done, press *Cancel•No.*



Global parameters are those on the EDIT/System•MIDI and Sample pages, as well as the MULTI-IN MIDI CHANNEL settings on the EDIT/Track page. These parameters are global to the EPS-16 PLUS and are not saved with the instruments, sequences, or banks. For instance, if you normally sample from a mic input, it would be convenient for you to save that setting to disk as a global parameter. That way when you boot up, the EPS-16 PLUS will always be ready to sample a mic input signal, and not a line signal.

- Select SAVE GLOBAL PARAMETERS. Make sure you have a formatted (non-write-protected) disk with the most recent operating system in the disk drive.
- Press *Enter•Yes.* The display reads DISK COMMAND COMPLETED.

The next time you "boot" the EPS-16 PLUS with that disk, the new settings will be loaded in as the defaults.



This command allows you to load global parameters from disk, without having to reboot the EPS-16 PLUS.

- Select LOAD GLOBAL PARAMETERS. Make sure you have the disk containing the global parameters and operating system loaded in the disk drive.
- Press *Enter•Yes.* The display reads DISK COMMAND COMPLETED.



Use this command to create a new directory on the current disk. Directories are not generally necessary when working with floppy disks, as it is unlikely that you will fit more than 38 files on a floppy. However, a hard disk (which can be used with the optional SP-2 SCSI Interface), can hold hundreds of files and directories are a necessary part of managing and organizing those files. See the *Small Computer System Interface (SCSI) Manual,* included with the optional SP-2 EPS-16 PLUS Small Computer System Interface, for details.

CMD SYSTEM• MIDI

CHANGE STORAGE DEVICE

Press Command / System•MIDI / 5

Use this command to determine whether the EPS-16 PLUS will use floppy disk, FLASHBANK, or hard disk (SCSI) for storage.

- Select CHANGE STORAGE DEVICE. Press *Enter•Yes.*
- Select LOAD DEVICE=FLOPPY/SCSI 1 thru 8/FLASH.
- You **must** press *Enter•Yes* to change the storage device. Otherwise, you will get the COMMAND ABORTED message.
- Press *Enter•Yes.* The display reads COMMAND COMPLETED.

CMD SYSTEM• MIDI

SAVE MACRO FILE

Press Command / System•MIDI / 6

Macros provide a way to move quickly from one place in the directory structure to another. Again, they are primarily for use with a SCSI hard disk. See the *Small Computer System Interface (SCSI) Manual* included with the *optional* Model SP-2 EPS-16 PLUS Small Computer System Interface.

CMD SYSTEM• MIDI

COPY FLOPPY DISK

Press Command / System•MIDI / 7

Note that this procedure requires erasing whatever is in the EPS-16 PLUS internal memory, so make sure any instruments or sequences are saved before proceeding. You can use either blank or formatted disks. The EPS-16 PLUS will ask you if you want to format a blank disk. Make sure the formatted destination disk does not contain any files that you want to keep because they will be erased. It is also a good idea to write-protect the source disk, so there's no chance of losing data.

- Select COPY FLOPPY DISK.
- Press *Enter•Yes.* The display asks MUST ERASE MEMORY OK?
- Press *Enter•Yes* (or *Cancel•No* to abort the procedure). The display responds INSERT SOURCE DISK.
- Put the floppy disk you want to copy (source disk) into the internal disk drive and press *Enter•Yes.* After all the files on the source disk have been read into memory, the display will prompt INSERT DEST DISK.
- Eject the source disk and insert the disk you want to copy to (the destination disk) and press *Enter•Yes.*
- If the destination disk is blank the display will ask FORMAT DISK? Press *Enter•Yes* (or *Cancel•No* to abort the procedure).
- When all the files have been written to the destination disk, the display says COMMAND COMPLETED.



This command is used to format the optional EPS-16 PLUS FLASHBANK Memory Expander (model FB-1 or FB-2). See the FB-1 or 2 manual for more details.



The EPS-16 PLUS can be used to receive and store MIDI System Exclusive (Sys-Ex) messages. These Sys-Ex messages can be saved to and loaded from disk. *Since the EPS-16 PLUS erases the internal memory to "buffer" incoming Sys-Ex signals, it is very important that you save all internal sounds and sequences that are valuable to you before performing this command.*

The MIDI Sys-Ex recorder in the EPS-16 PLUS lets you store to disk things like:

- The program (patch) memory of any MIDI synth,
- Patterns from a drum machine,
- The sequence memory of a MIDI sequencer,
- Wavesample dumps from samplers and drum machines, and
- The preset memory of any MIDI reverb or other effects device employing MIDI.

SAVING System Exclusive Data from an External Device

- Connect the MIDI Out of the sending device to the MIDI In of the EPS-16 PLUS.
- Make sure that the EPS-16 PLUS O.S. disk is in the disk drive.
- Select MIDI SYS-EX RECORDER.
- Press *Enter•Yes.* The display reads MUST ERASE MEMORY OK?
- Press *Enter•Yes.* The display reads WAITING... The EPS-16 PLUS is ready to record any System Exclusive message that it receives.
- Send the Sys-Ex data from the external device to the EPS-16 PLUS. The display will flash RECEIVING while the Sys-Ex data is being received by the EPS-16 PLUS. If the Sys-Ex data have been received successfully, the EPS-16 PLUS will display CANCEL=QUIT ENTER=SAVE.

At this point, you can send the EPS-16 PLUS another Sys-Ex message (from a different device, for example) which will be stored right after the first one. You can save as many different messages as memory permits in a single Sys-Ex file. Each time a message is received, the display will flash RECEIVING and then return to CANCEL=QUIT ENTER=SAVE. When the data is later retransmitted, all the messages will be sent out in the order they were received. In this way you could load new data into all your devices with a single Sys-Ex Load command from the EPS-16 PLUS.

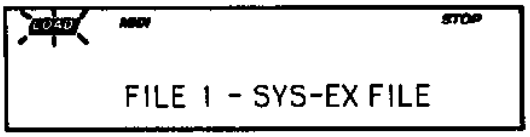
To save the Sys-Ex file to disk:

- Insert a formatted, double-sided 3.5" disk into the drive of the EPS-16 PLUS.
- Pressing *Enter•Yes* displays FILENAME=SYS-EX FILE. You can name your Sys-Ex file by using the data entry controls, if you wish.

- Press *Enter•Yes.* The display reads SAVING <filename>, then DISK COMMAND COMPLETED.
- Pressing *Cancel•No* aborts the command.

LOADING System Exclusive Data from Disk to an External Device

- Connect the MIDI Out of the EPS-16 PLUS to the MIDI In of the receiving device.
- Press *Load,* then *MIDI.* Scroll until the desired Sys-Ex file is selected. The display looks something like this:



- Press *Enter•Yes.* The display reads LOADING <filename>.
- The display then reads CANCEL=QUIT ENTER=SEND.
- Press *Enter•Yes* to send the Sys-Ex file to a receiving device, or
- Press *Cancel•No* to abort the command.

After you have sent your MIDI Sys-Ex file to a receiving device, the CANCEL=QUIT ENTER=SEND screen returns. You can retransmit the data by pressing *Enter•Yes,* in case it was not properly received for some reason.

- Once the data has been successfully received by the external device, you can, if you wish, make a back-up copy of the file onto a different disk.
- Press *Cancel•No.* The EPS-16 PLUS asks RESAVE FILE TO DISK?
- Press *Enter•Yes* to save the Sys-Ex file to disk, or *Cancel•No* if you don't wish to make a backup.



This command is used to label EPS-16 PLUS disks with a seven character Disk I.D. These labels are used to give each of your EPS-16 PLUS disks a unique identity, thereby allowing banks to load from multiple disks (see *Section 3 — Instruments and Banks* for more details).

To label an EPS-16 PLUS disk:

- Select WRITE DISK LABEL.
- Press *Enter•Yes.*
  The display will read USE CURRENT LABEL? Pressing the *Enter•Yes* allows you to use the disk label from the last disk read by the drive. This can speed up the labelling process, as it is likely you'll want to keep the same first four alpha-numeric characters, changing only the three-digit number at the end of the label. If not, pressing *Cancel•No* defaults to DISK000.
- Use the data entry controls to name the disk.
- Press *Enter•Yes.* The display briefly reads DISK COMMAND COMPLETED, then returns to the COMMAND/System•MIDI page.



This procedure requires erasing all sounds and sequences in the internal memory, so save any important data first. Then:

- Select LOAD MIRAGE-DSK SOUND.
  The display asks MUST ERASE MEMORY, OK?
- Press *Enter•Yes.*
- Use the data entry controls to select which sound from the Mirage disk you want to load — 1,2, or 3.
- Scroll right and choose UPPER, LOWER or UPPER+LOWER.
- Press *Enter•Yes.*
- Insert the Mirage disk containing the sound you want to load.
- Press *Enter•Yes.* After it is loaded and converted, the sound should be renamed and saved to disk as an EPS-16 PLUS instrument.

Converting Mirage Sounds to EPS-16 PLUS Sounds

In the Mirage, the memory is divided into two 64 Kbyte sections, Lower and Upper. Within each section there are eight Wavesamples. The EPS-16 PLUS converts the Mirage memory into two Wavesamples: Wavesamples 1 and 17. All Lower data is contained in WS#1. All Upper data is contained in WS #17. All other EPS-16 PLUS Wavesamples are copies of these two (they do not contain their own data). The WAVES AMPLE INFORMATION command will verify this. Two layers are created, 1 and 2, to simulate the Mirage voice, which has two oscillators layered together. In some Mirage sounds, layer 2 is inaudible and may be deleted without affecting the sound. Some other points to remember—

- Wavesamples which do not appear in the keymap are created anyway. Sometimes these are alternate samples used in the Mirage's program variations. Sometimes these are useless and may be deleted.
- The EPS-16 PLUS defaults to converting Mirage program #1. Other programs may be converted by scrolling right to the parameter PROGRAM= in the command before pressing *Enter•Yes.*
- Most Mirage sounds use all 64 K of memory. For those sounds that don't, truncating will make the sound smaller. The EPS-16 PLUS will not truncate a Wavesample if there are copies that use the same wavedata. *You most move the sample start and end of all the copies, or delete the copies, then truncate.*



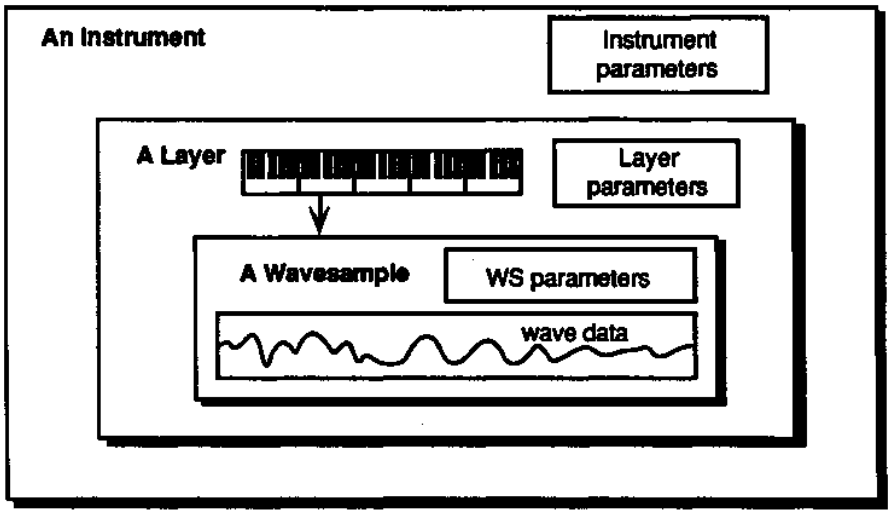
This command is for formatting a hard drive for use with the *optional* SP-2 EPS-16 PLUS Small Computer System Interface. See the *Small Computer System Interface (SCSI) Manual* for details.

Section 3 — Instruments and Banks

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Instruments

The EPS-16 PLUS keeps all its sounds in a format called the Instrument This format is used for all disk storage. The internal structure of an instrument has three levels: Instrument, Layer, and Wavesample. Up to 127 Wavesamples are grouped together into layers, and there can be up to eight layers in the instrument. Their relationship is shown in the following graphic:



At the instrument level, there are parameters which affect the whole instrument; for example the MIDI functions and the effect of the patch selects. These parameters are found on the EDIT/Instrument page, which will be discussed later in this section. The *Wave and Voice Parameters*, those that deal with layer and Wavesample editing used in sound programming, will be discussed in *Section 6 — Wavesample Parameters* and *Section 7—Voice Parameters.*

Banks

Banks provide a way to load a whole group of instruments and sequences into the EPS-16 PLUS with a few button presses. When you save a bank to disk, it is like taking a "snapshot" of the contents of the EPS-16 PLUS internal memory — the EPS-16 PLUS stores in the bank file information about which instruments are loaded into which of the eight Instrument•Track locations, and the current song and sequences (if any), along with the performance presets. When you load a bank, the EPS-16 PLUS will reproduce the same state by loading those instruments into the same locations and loading the song with its related sequences. A bank will also save any performance presets you have created (see discussion later this section).

For example, you might have a piano loaded into Instrument•Track #1, a bass in Instrument•Track #2, and drums in Instrument•Track #3, and you have created a number of performance presets containing different keyboard configurations of those instruments. Let's say you also have in memory a song, which is composed of 12 sequences, If you now save the contents of memory as a bank, you can later call up this exact setup by loading the bank.

A Few Important Notes About Banks

- The bank file on a disk doesn't contain the actual instrument and song files — it is just a set of instructions telling the EPS-16 PLUS what to load and where. All the instruments and the song in a bank must be saved to disk separately (or loaded in from a disk with a proper Disk Label ID) *prior* to saving the bank,

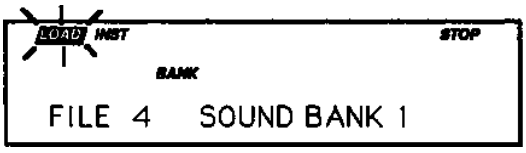
- Any instruments already loaded into locations not affected by the bank will be left intact (memory permitting). You can select and play such instruments while the bank loads. Also, any instruments included in the bank that are already in memory will be left there and not reloaded, even if they are in different Instrument/Track locations in the new bank. In such a case the EPS-16 PLUS will simply move the instrument to the new location.

- The instrument and song files referred to by a bank can be on many different disks. Each time you load an Instrument or Song, the EPS-16 PLUS "remembers" what disk it was loaded from. When you load a bank file, the EPS-16 PLUS will ask by name for any disks it needs to load the files included in the bank. This is why it is very important that you give each of your disks a unique name (Disk Label) and write that name on the disk itself.

- If there was a song in memory when the bank was saved, the EPS-16 PLUS will automatically load the song as part of the bank, provided it was first saved to a disk using the SAVE SONG AND ALL SEQS command. If you want the bank to load without a song, erase the contents of the sequencer memory before saving the bank to disk.

To Load a Bank

- Press *Load,* then *Instrument.*
- Use the *Up/Down Arrow* buttons to view the different files.



When a bank file is showing, the BANK indicator lights on the display along with the INST indicator.

- Once a bank file is showing, press *Enter•Yes.* The EPS-16 PLUS will begin loading the instruments and the song data. As it loads each instrument the display tells you what it doing. As soon as any of the instruments is finished loading you can select that instrument and play while the rest of the bank loads.

At some point in the loading process, you may encounter the following message:



This prompt is informing you that an instrument or song saved as part of the bank is on a different disk than the disk currently in the drive. When this occurs:

- Eject the current disk in the disk drive and replace it with the disk that matches the Disk Label ID requested by the EPS-16 PLUS (you are writing these names on your disks, aren't you?). For more information on Disk Label identification see *Section 2 — System Control* and *Section 11 — Storage*.
- Press *Enter*. The EPS-16 PLUS will resume loading until completed, or until the point when it needs another disk.
- When it has finished loading the instruments, the EPS-16 PLUS will load the song (if any) and then set up any copied instruments included in the bank.

Performance Presets

Once you have a number of instruments loaded into the EPS-16 PLUS, there are so many possible combinations for selecting, stacking, mixing, and manipulating the ranges of those instruments that it can get a bit hard to manage in real-time performance. That is where performance presets come in.

For each bank you save, you can create eight performance presets which allow you to store different keyboard configurations. By selecting a performance preset you can instantly recreate the state of the "pile" at the time the preset was created.

Within each preset, the following information is saved for instant recall:

- Which instruments are selected, de-selected, or stacked (on the "pile" in LOAD mode).
- The status of the patch select buttons for each Instrument•Track.
- The Volume (Mix Level) of each Instrument•Track.
- The pan setting of each Instrument•Track.
- The MIDI program number of each instrument (as selected on the EDIT/Instrument page).
- The Transpose and Key Range settings found on the EDIT/Pitch page.

When the EPS-16 PLUS is in LOAD mode, with the LOAD indicator not flashing, pressing the buttons numbered 1-8 (in the page section of the front panel) will select the eight performance presets.

Remember: When the LOAD indicator is flashing, the display is showing you disk files for loading. When the LOAD indicator is lit but not flashing the display is showing you the name(s) of the of instruments in the internal memory.

Additional Notes About Performance Presets

- Pressing "0" will de-select all the instruments in memory and return them to the original settings for Range, Transpose, Volume, etc. which were in effect when they were loaded (or most recently saved to disk). You can press "0" at any time (whether a preset is in effect or not) to return all you instruments to their "starting points."
- If you save an instrument to disk while a preset is in effect, all the current

values will be saved with the instrument. Be careful that you don't accidentally save an instrument with some strange values that you had meant to be part of a temporary setup. You can select "Preset 0" (see above) before saving the instrument to avoid this.

- If no preset has been created for one of the eight possible locations, pressing that number will have no effect

Creating a Performance Preset

Whenever you have set up some configuration of instruments (in LOAD mode) which you want to preserve for later recall, you can save that configuration as a performance preset with the following steps:

- In LOAD mode, set up the instruments in memory in some configuration you want to preserve.
- Press *Command,* then *Instrument.*
- Press the *Left* or *Right Arrow* button until the display shows CREATE PRESET.
- Press *Enter•Yes.*
- Use the *Data Entry Slider* or the *Up* and *Down Arrow* buttons to select a number 1-8. This will determine which of the eight possible performance presets the current keyboard configuration will be saved.
- Press *Enter•Yes.* The display reads COMMAND COMPLETED, and the preset is made.
- Press *Load* to return to the "pile." Pressing the number that you selected for the preset will now instantly recall this keyboard configuration. Repeat this procedure for each performance preset you want to create, selecting a new number (from 1-8) for each.

Important: Performance presets are saved to disk only when you save the contents of memory as a bank. When you load a bank, any presets which were present at the time the bank was saved will be recreated

Suggested Uses for Performance Presets

The most obvious use for performance presets is to have instant access to different combinations of instrument selected, stacked, and mixed in various ways. Here are some other possibilities:

- Easier access to patch select variations. Suppose you have selected the piano sound and "locked in" some patch variation, such as the detuned honky-tonk piano sound. By creating a preset while the alternate patch is locked in, you can later return to that sound just by selecting the preset.
- Controlling MIDI instruments. Suppose you have created one or more MIDI instruments for sequencing remote devices from the EPS-16 PLUS. Each performance preset can store a different program number, volume setting, keyboard range and transpose amount for each of those instruments. When you select a preset, each instrument which has a status of MIDI or BOTH (SEND KEYS TO= on the EDIT/Instrument page) will send a program change and MIDI volume information on its designated MIDI channel (assuming TRANSMIT ON = INST CHAN on the EDIT/System•MIDI page). Performance presets let you store up to eight totally different configurations. This allows you to easily recall stacks and combinations of external MIDI instruments.

Performance Tip — Creating Keyboard Splits

One of the most common usages of presets is a keyboard split, in which your left hand plays an "accompaniment" sound and your right hand plays a "solo" sound. This is easy to set up on the EPS-16 PLUS by stacking the two sounds and assigning them different key ranges. You can save this arrangement as a preset so that any time you select that preset, you'll recall the keyboard split In fact, using this method you can create up to eight split points across the keyboard.

Since each instrument•track in the keyboard split has its own Transpose value, you are not limited to bass notes on the piano just because it's on the bottom of the keyboard. On the EDIT/Instrument page, set the key range to the keys you want to play and then transpose the sound up or down until it's playing in the range you want.

The MIDI Connection

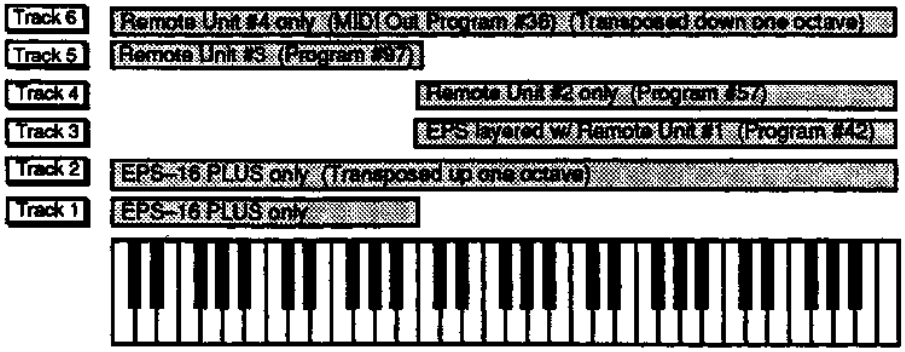
Musical Instrument Digital Interface — that magical connection that lets you play one instrument (or a whole roomful of them) from another. MIDI is a standard that has been agreed upon by manufacturers for translating musical events into specific numbers which are transmitted and received by MIDI instruments.

For instance,when you play middle C on a MIDI keyboard, it instantly sends to its MIDI Out jack a series of numbers representing a *Key Down* event, along with the location of the note on the keyboard and how hard the key was struck. When you release the key, the MIDI keyboard sends a number meaning *Key Up*. A MIDI instrument connected to the MIDI keyboard can receive and translate those numbers, and will play the middle C itself. The same thing happens whenever you move a controller, such as the pitch or mod wheel, or when you select a new sound—each of these events is translated into a series of numbers which are transmitted out the MIDI Out jack.

The Smart Transmit Function

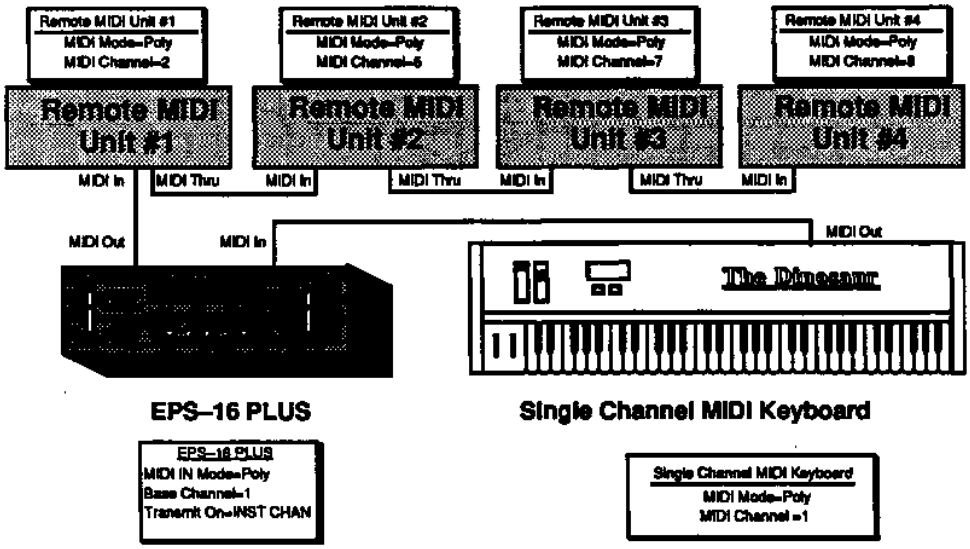
The EPS-16 PLUS' Smart Transmit Function is a unique and powerful feature which allows the EPS-16 PLUS to add new MIDI master controller features to any keyboard hooked up to it Connect your favorite keyboard and it becomes an eight zone controller with independent control over volume, transpose, key range, MIDI channel, program change remapping, and sustain pedal on/off. The major advantage of the Smart Transmit function is that it gives you the power and flexibility of a controller keyboard, even if your MIDI keyboard lacks these multi-channel abilities. Smart Transmit also allows you to hear additional MIDI instruments that you are sequencing with the EPS-16 PLUS' internal sequencer without the hassle of resetting MIDI parameters on your controller keyboard each time you switch tracks

Let's take a look at how to implement and utilize the Smart Transmit function. First, we'll need to determine which EPS-16 PLUS sounds and external MIDI devices should play across specific areas of the keyboard.. For example:



This set-up could also be used for sequencing, the only difference being that the key ranges would have no effect

The next step is to make MIDI connections between all the modules and set their system controls to receive MIDI. The diagram below illustrates the connections and MIDI settings:



With the MIDI connection made and the parameters set properly, the final step is to select the proper settings on the EDIT/Instrument page.

The chart below shows the settings that would be used to create the multi-timbral split/layer combination in this example. Refer to the descriptions later in this section for detailed information on each of the parameters.

Track	1	2	3	4	5	6	7	8
Goal	Play EPS Sound	Play EPS Sound	EPS+ I MIDI Ch. 21	Play MIDI Channel 5	Play MIDI Channel 7	Play MIDI Channel 8	OFF	OFF
Transpose	+0+00	+1+00	+0+00	+0+00	+0+00	-1+00	N/A	N/A
Key Range	C2-B3	C2-C7	C4-C7	C4-C7	C2-B3	C2-C7	N/A	N/A
MIDI Out Channel	N/A	N/A	2	5	7	8	N/A	N/A
MIDI Out Program	N/A	N/A	042	057	097	036	N/A	N/A
MIDI Status	LOCAL	LOCAL	BOTH	MIDI	MIDI	MIDI	OFF	OFF

Remember: You must have TRANSMIT ON=INST CHAN and MIDI IN MODE=POLY on the EDIT/System•MIDI page in order for Smart Transmit to work. Also remember to have the cables to any external MIDI devices connected to the EPS-16 PLUS'S MIDI Out, *not* the MIDI Thru jack.

After setting up these parameters, save the bank, giving it a name that describes the set-up. Once this is done, whenever you load the bank, each track with MIDI or BOTH status will send the appropriate program changes, volumes, etc. to the receiving instruments on its MIDI channel (tracks with LOCAL status will set up with correct parameters as well).

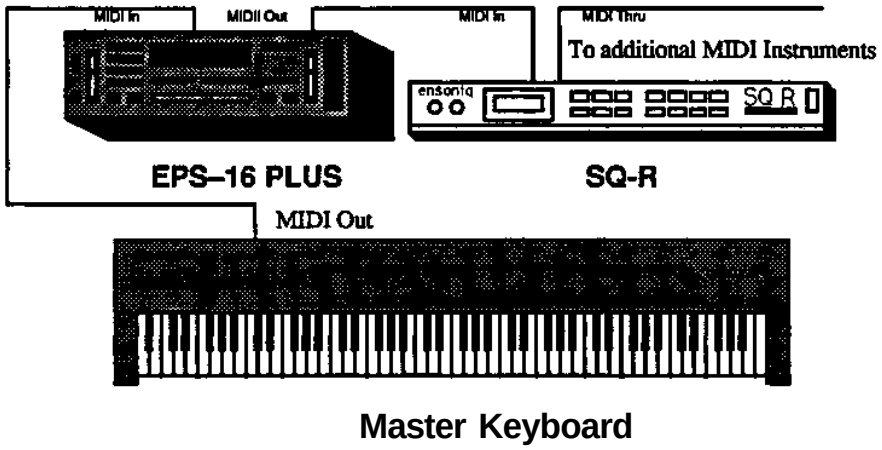
Pressure

The EPS-16 PLUS' Smart Transmit function also allows you to retransmit (and in some cases alter) the type of pressure a track receives, using the Pressure parameter. The chart below shows the relationship between type of pressure received, track pressure type (PRESSURE MODE parameter setting on the EDIT/Instrument page), and the type retransmitted:

When the EPS-16 PLUS receives:	with Pressure set to:	The EPS-16 PLUS will retransmit
Channel	None	No Pressure
Channel	Channel	Channel Pressure
Channel	Key	No Pressure
Key	None	No Pressure
Key	Channel	Channel Pressure
Key	Key	Key Pressure

Making a MIDI Instrument

Let's suppose that you have a synthesizer (say an ENSONIQ SQ-R) connected to the EPS-16 PLUS as shown below:



You want to be able to select the SQ-R from the EPS-16 PLUS front panel and then play or sequence it from your master controller just as you would an EPS-16 PLUS instrument. To accomplish this, you can make an EPS-16 PLUS instrument which contains no sample data, and which will not sound on the EPS-16 PLUS but will only play over MIDL Such "MIDI Instruments," as we call them, use up very little memory, and can be loaded from disk almost instantly.

- Press *Command,* then press *Instrument.*
- Scroll left or right until the display reads CREATE NEW INSTRUMENT.
- Press *Enter•Yes.*
  The display says SELECT UNUSED INST= 1. The new instrument will be created in the Instrument•Track location indicated. You can select a different location (by pressing any unused Instrument•Track button), or just press *Enter•Yes.*
- Press *Enter•Yes.*
  The EPS-16 PLUS will create a new unnamed instrument in the location you indicated. The new instrument is selected (its LED is lit yellow). Note that it contains no layers or Wavesamples, and thus will make no sound when you play the connected MIDI keyboard.
- Press *Edit,* then press *Instrument.*
  This puts you on the EDIT/Instrument page where you will set the characteristics of your new instrument
- Using the arrow buttons scroll left (or right) until the display shows SEND KEYS TO = BOTH. Use the arrow buttons to scroll up (or down) until the display reads SEND KEYS TO=MIDL
  Now the instrument will only play over MIDI, sending keys, controllers, etc. on its designated MIDI channel.
- Scroll left to the parameter MIDI OUT CHANNEL = _.
  This is the MIDI channel that the instrument will send on. Let's suppose that the SQ-R in our example is set to receive on MIDI channel 3. We would set this parameter to MIDI OUT CHANNEL= 3. Now selecting and playing this instrument should play the SQ-R.
- Name the new instrument
  Scroll left until the display shows NAME = UNNAMED INST, and use the *Arrow* buttons to name/rename the instrument. Give the new instrument a name which describes it. In this case, we might name it SQR - CHAN 3.
- Press *Load* to return to LOAD mode, and select the MIDI instrument.
  The instrument's name and volume level show on the display, like any other EPS-16 PLUS instrument. When you play it from the controller keyboard you should hear the EPS-16 PLUS.
- You can select, de-select, or stack the MIDI instrument as you would a local instrument.
- You can change its keyboard range so it only plays over a specified part of the keyboard.
- Changing its volume (by moving the *Data Entry Slider)* will send MIDI volume changes to the SQ-R, letting you mix its level just as you would a local instrument.

- Save the new instrument to disk,
  Save the instrument to a formatted disk (as described in *Section 11 — Storage).* You can later load it into any of the eight Instrument•Track locations and play the EPS-16 PLUS just as you would load and play a sampled instrument-

Create customized MIDI-only EPS-16 PLUS instruments for each of your remote devices. Then load them into memory for playing and sequencing specific external instruments. Just remember to follow these rules:

- TRANSMIT ON - must be set to INST CHAN on the EDIT/Systcm•MIDI page.
- Each external device for which you create a MIDI instrument should always be set to receive in POLY (or MULTI) mode, OMNI OFF, and always on the same MIDI channel that you assigned to the related EPS-16 PLUS MIDI instrument
- Make sure that any EPS-16 PLUS instruments which you don't want sending notes out MIDI (such as most sampled instruments) are assigned to SEND KEYS TO = LOCAL. Then save the instrument(s) to disk.

EDIT/Instrument Page

The parameters on this page control the attributes of the individual Instrument. To access these parameters press *Edit,* then *Instrument*



Using the Patch Select Buttons

The two patch select buttons can be programmed to provide instant access to up to four completely different sounds within each instrument. The alternate sound might be a different set of samples, or the same samples with different envelopes, or a chorused version of the sound, or perhaps a different range of an instrument.

What you are doing when you press either or both of the patch select buttons is selecting different layers to play. A layer is a group of Wavesamples spread across the keyboard — each instrument can contain up to eight layers. For each of the four possible patches, any of these eight layers can be made to play or to remain silent.

- The patch select buttons are "momentary" — an alternate patch will play only on notes played while the button is held down unless you "lock in" a Patch.
- To lock in a particular patch so that it will play without having to hold any buttons, while holding down the patch select button(s) corresponding to the patch you want to lock in, simply press the *Instrument•Track* button.
- To return to the default patch (neither patch button down) after you have locked in one of the other patches, press the *Instrument•Track* button again (with neither of the patch select buttons held down).

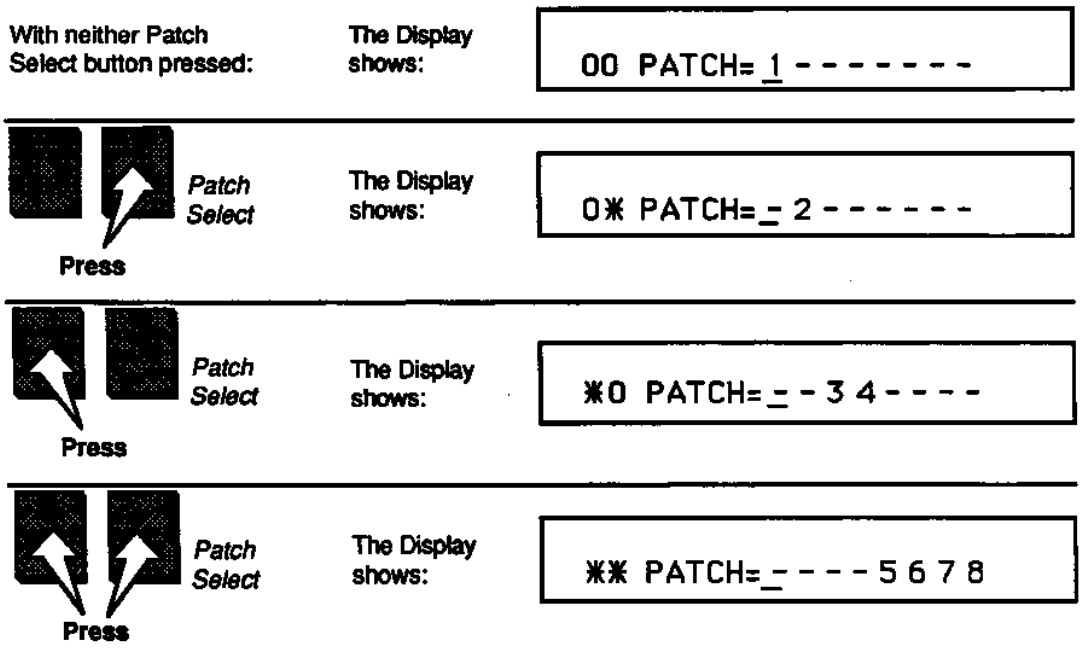
Programming Patches

This parameter allows you to program a layer—or combination of layers—to either play or not play depending on which patch select buttons are pressed.

To program patches:

- Select the instrument on which you would like to program patches.
- Select the 00 PATCH parameter (no patch select button pressed).
- With no patch select buttons pressed, use the *Left/Right Arrow* buttons to select the individual layers and the *Up/Down Arrow* buttons to enable and disable them. This will program the default patch (the one that will play with no patch select buttons pressed).

Here's how a typical instrument might react when you press the different patch select buttons:



- A number means that a given layer is enabled, and will play in that patch;
- A dash means that the layer is disabled for that patch and will not play.

- Once you have the default patch programmed, press the left patch select button. Notice that the left hand character in the display is now an asterisk, rather than a zero. This indicates the status of that particular patch select button.
- With the left patch select button held down, use the *Left/Right Arrow* buttons to select the individual layers and the *Up/Down Arrow* buttons to enable and disable them, as you did with the default patch.
- Repeat the procedure with the right hand patch select button held down, then with both patch select buttons held down.
- Remember to resave the instrument after you've made any changes.

The Patch Select buttons are sent and received over MIDI as MIDI controller #70. The EPS-16 PLUS recognizes the 00-31 range as both patch select buttons up; 32-63 as the right patch select down; 64-95 as the left patch select and 96-127 as both patch selects down.



Determines which layer(s) will be triggered when a MIDI key down is received.

- Select KEYDWN LAYERS=########. Use the cursor and the *Up/Down Arrow* buttons to select either a number Gayer enabled on keydown) or a dash (layer disabled on keydown) for that location.



This page shows which layer(s) will be triggered when a MIDI key up message is received A good example of this would be the "thunk" sound made by a harpsichord when you release a key. This release sound can be sampled separately and placed in a layer which you designate as a keyup layer. If you want a layer to be triggered only when keys are released, be sure to turn that layer off with the KEYDWN LAYERS parameter.

- Select KEYUP LAYERS=########. Use the cursor and the *Up/Down Arrow* buttons to select either a number (layer enabled on keyup) or a dash (layer disabled on keyup) for that location.



Use this page to determine which MIDI channel the instrument will transmit on *if* the TRANSMIT ON= parameter on the EDIT/System•MIDI page is set to INST CHANNEL. Any of the 16 MIDI channels can be selected.

If TRANSMIT ON=BASE CHANNEL, the EPS-16 PLUS will only send on the Base MIDI channel (also selected on the EDIT/System•MIDI page) no matter which MIDI channel is selected.

Also, if the instrument has been assigned LOCAL status, it won't matter what MIDI channel you assign here—playing that instrument will not send any MIDI information.

Range: MIDI channels 1 to 16



This page allows you to choose which program change number will be sent over MIDI when the instrument is selected. If the instrument has been assigned LOCAL status it won't matter what this parameter is set to because the instrument won't send program changes. The MIDI Out program for each track is stored in the eight performance presets, so you can use presets to send new program changes on any instruments which have MIDI or BOTH status.

Range: 1 to 128

EDIT INST

PRESSURE MODE

Press Edit / Instrument / 5

If TRANSMIT=INST CHAN (selected on the EDIT/System•MIDI page) then this parameter determines which type of pressure—channel or Poly-Key, or no pressure at all—will be transmitted over the instrument's MIDI channel. If the instrument is assigned LOCAL (the MIDI STATUS= parameter, later in this section) status, this determines what type of pressure (if any) it will respond to when you play the keyboard.

When PRESSURE=OFF:
- The instrument will not send or receive pressure of either type over MIDI.
- Local voices played from the keyboard or the sequencer will not respond to pressure.
- The sequencer will not record pressure into any tracks you record. The sequencer will, however, play back pressure if it was previously recorded into a track.

Note: You should select PRESS=OFF whenever you don't want or need pressure for a given instrument, particularly when sequencing. Pressure eats up sequencer memory rapidly, so whenever you record a track, whether local or MIDI, with a sound that doesn't respond to pressure, set this parameter to OFF. This will avoid wasting valuable sequencer memory and avoid clogging up the MIDI stream with a lot of unnecessary pressure information.

When PRESSURE=KEY:
- Local voices played from the MIDI keyboard connected to the EPS-16 PLUS will respond to key pressure only.
- The sequencer will record key pressure into any tracks you record.
- The EPS-16 PLUS will send only key pressure out via MIDI; however,
- Either channel pressure or key pressure will be received via MIDI as it comes in.

When PRESSURE=CHAN:
- Local voices played from the MIDI keyboard connected to the EPS-16 PLUS will respond to channel pressure only.
- The sequencer will record channel pressure into any tracks you record.
- The MIDI keyboard connected to the EPS-16 PLUS will send only channel pressure out via MIDI, however.
- Either channel pressure or key pressure will be received via MIDI as it comes in.

At present, channel pressure is recognized by more MIDI devices than key pressure. If you are playing or sequencing an external MIDI device from the EPS-16 PLUS and pressure doesn't seem to have an effect, it could be the EPS-16 PLUS is set to send key pressure and the receiving instrument only recognizes channel pressure. In this case, set this parameter to PRESSURE=CHAN when playing or sequencing that instrument.



This parameter will determine whether the instrument will play LOCALLY (only on the EPS-16 PLUS), over MIDI, or both. There are four possible settings:

- BOTH — Keys, controllers, etc. will be played locally and will be retransmitted via MIDI over the selected MIDI channel when TRANSMIT ON=INST CHAN and MIDI IN MODE=POLY.
- LOCAL — The instrument will only play local voices, and will not send any data out MIDI even with the parameters set for retransmitting.
- MIDI — Keys, controllers, etc. will be sent out via MIDI when TRANSMIT ON=INST CHAN and MIDI IN MODE=POLY. The instrument will not play EPS-16 PLUS voices at all. This is comparable to Local Off on some keyboards. Use this status when you want to create MIDI-only Instruments/Tracks for playing or sequencing remote MIDI devices.
- EXT — This mode is identical to MIDI on the rack mount The mode exists for use in the EPS-16 PLUS keyboard, which uses the same operating system..

Note: These settings are in effect only when TRANSMIT ON=INST CHANNEL on the EDIT/System•MIDI page.



This display shows how much internal memory the instrument occupies. This is a *readout only* and can't be modified. Size is shown in *Blocks*. One Block=256 samples (or words). Four Blocks=lk sample/words.

When you want to know if there's enough room to save a particular instrument to a particular disk, you can compare the instrument size (shown here), to the FREE DISK BLOCKS shown on the EDIT/System•MIDI page.



You can use this parameter to change the name of an existing instrument, or name a new one that you've just created. The display shows the twelve-character name of the instrument with a cursor beneath the first character. Newly sampled or created instruments are called UNNAMED INST until you rename them.

- Select NAME=####. Use a combination of the *Arrow* buttons to name/rename the Instrument

EDIT INST **PATCH SELECT**
Press Edit / Instrument / 9

This differs from the PATCH parameter (earlier in this section) in that this parameter allows you to permanently "lock in" one of the four patch variations, or to select a special "held" mode. The PATCH parameter, on the other hand, programs which layers will play for the various patch select button assignments.

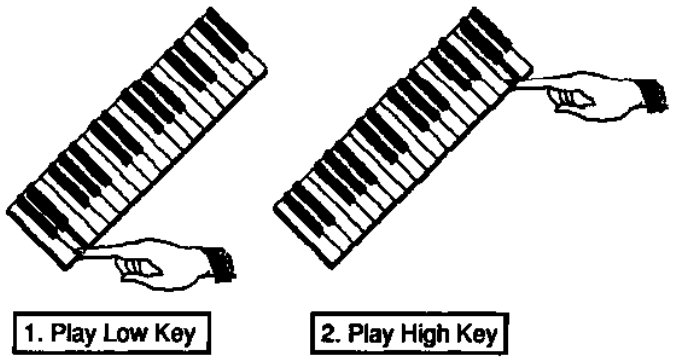
Setting	**Patch used by track**
LIVE	uses the current state of the buttons to select a patch
-00-	always uses the 00 patch (no patch selects down)
-0•-	always uses the 0• patch (right patch select down)
-•0-	always uses the •0 patch (left patch select down)
-••-	always uses the •• patch (both patch selects down)
HELD	uses the patch set by the first key hit while touching the patch buttons

The HELD setting is special because it lets you easily hold a patch select variation by playing a note from MIDI while touching the patch select button(s). The first MIDI note received after touching the patch select buttons will hold that patch select variation as the current patch for the track. You may then continue to play without having to touch the patch select buttons, which makes two-handed playing easier. If you wish to return to the 00 patch, touch either of the patch select buttons and release it *before* you play the next note. This will hold the 00 patch.

EDIT INST **INSTRUMENT KEY RANGE**
Press Edit / Instrument / scroll using the arrow buttons

This parameter allows you to set the keyboard range of the instrument. Keyboard ranges are very important in the creation of keyboard splits and layers (see earlier this section for more details). The EPS-16 PLUS allows you to set the keyboard range in a very easy fashion.

• Select the LO=_ half of Instrument Key Range parameter, then from the MIDI keyboard:



Make sure after you've set the ranges that you change screens before playing the keyboard again. The Instrument Key Range parameter is always active when shown on the display.

Remember: If you set the Low Key *higher* than the High Key, the instrument is in effect turned off and will make no sound If you do this, simply reset the parameters.



Each instrument can have its pitch transposed (raised or lowered) by octaves and semitones within an eight octave range. The transpose setting affects both the pitch played by local EPS-16 PLUS voices and the key number transmitted via MIDI.

The *Left/Right Arrow* buttons will toggle the underline (showing the active field) from octave to semitone and back.

Ranges:	Octave parameter	-4 to +4 octaves
	Semitone parameter	-11 to +11 semitones•

• It is possible to extend the transposition outside of the normal range by using the up and down arrow buttons to edit the semitone value to a maximum of + or - 8 octaves and 11 semitones, although this may cause unexpected results.

COMMAND/Instrument Page



Use this command to create a new instrument This is useful for creating instruments that will only play out the MIDI port (MIDI Instruments).

- Select CREATE NEW INSTRUMENT.
- Press *Enter•Yes.* The display reads SELECT UNUSED INSTR=##.
- Press one of the unused *Instrument•Track* buttons.
- Press *ententes.* The display reads COMMAND COMPLETED.



Use this command to copy the selected instrument This is useful for making copies of an instrument in several tracks for sequencing. The copies don't use any internal memory, they just "point to" the data in the original instrument.

- Select COPY INSTRUMENT.
- Press *Enter•Yes.* The display reads SELECT UNUSED INST=##.
- Press one of the unused *Instrument•Track* buttons.
- Press *Enter•Yes.* The display reads COMMAND COMPLETED.

Shortcut:
- Make sure the instrument you want to copy is selected.
- While holding down the empty *Instrument•Track* button that you want to copy the *selected* instrument to, press *Enter•Yes.*



Use this command to delete the selected instrument from the internal memory. Note that this command has no effect on disk files, only on the internal RAM memory.

- Select DELETE INSTRUMENT.
- Press *Enter•Yes.* The display reads DELETE (name of Instrument)?
- Press *Enter•Yes.* The display reads COMMAND COMPLETED.

Shortcut:
- Make sure the instrument you want to delete is selected.
- While holding down the *lnstrument•Track* button of the instrument you want to delete, press *Cancel•No.*

CMD INST	**SAVE INSTRUMENT**
	Press Command / Instrument / 3

Use this command to save the selected instrument to floppy disk (or to a hard disk). See *Section 11 — Storage* for more details.

CMD INST	**SAVE BANK**
	Press Command / Instrument / 4

Use this command to save the current bank. See *Section 11 — Storage* for more details.

CMD INST	**CREATE PRESET**
	Press Command / Instrument / 5

This command is used to create each of the eight Performance Presets within a bank. See Performance Presets earlier this section for more details.

CMD INST	**DELETE INST EFFECT**
	Press Command / Instrument / 6

This command deletes the Effect portion of an instrument. This is a handy "memory saver." If memory is tight and you're using several instruments through a single bank effect, deleting the effect from each of the individual instruments in memory can free up enough memory to squeeze in that final track. Deleting the effect from an instrument trims about three blocks from its size.

After performing this command, the instrument itself will contain no effect. However, the instrument can still use the BANK or ROM effects.

Section 4 — Effects

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Understanding EPS-16 PLUS Effects

The EPS-16 PLUS has a powerful built-in signal processor which can produce a variety of effects. More importantly, its functions are integrated with, rather than added onto, the rest of the sampler. The flexible bus routing scheme and the extensive real-time control give the EPS-16 PLUS its *dynamic* effects capability.

The EPS-16 PLUS is equipped with an advanced digital signal processing system based on the ENSONIQ Signal Processor (ESP) chip. The ESP is designed specifically for digital audio signal processing and in the EPS-16 PLUS it works in tandem with a third generation version of the Digital Oscillator Chip (DOC HI) and a 16-bit digital-to-analog converter to provide a very high-quality output signal.

The digital effects processing has been designed to complement the advanced performance features of the EPS-16 PLUS, and many of the effects can have specific parameters modulated by various performance controls such as the mod wheel, key pressure, and others.

The effects are fully programmable, and may be customized for particular applications. Effects are most often stored as part of an Instrument, although each bank has its own independent effect. Each of these types of effects are treated a little differently, and are described on the following page.

Effect Types

The EPS-16 PLUS has three distinct types of effects; Instrument Effects, Bank Effects, and ROM Effects, all of which behave in different ways.

Instrument Effects

Each instrument that you load into the EPS-16 PLUS contains an effect and a complete set of parameter values which determine how that effect will sound. The effect is present even if none of the voices in the instrument are routed through the effect (e.g. all voices are sent to the auxiliary outputs - see the AMP page section), or FX= OFF, BANK, or ROM on the EFFECT/Select•Bypass page. Whenever you save an instrument, the effect settings are also saved with the instrument.

The current effect is displayed by pressing the *Effect/Select•Bypass* button and edited by pressing the *Edit* button, then *Effects*. The parameters that pertain to each effect are described in the Effect Parameters part of this section.

Bank Effect

Each bank contains an effect and a complete set of effect parameter values. When selected, this effect applies to all instrument/tracks (or their instrument voices) which are routed to either FX destination bus. Think of Instrument Effects as *individual* effects and the Bank Effect as a *global* effect

The effect is saved with each bank. It will remain unaffected until a new bank is loaded, unless it is specifically edited. Switching instruments within the bank will not select a new effect

Whenever an independent effect file (one that is not attached to either an instrument or a bank) is loaded from disk into the EPS-16 PLUS, it is placed in the Bank Effect location.

The bank effect is displayed by pressing the *Effect/Select•Bypass* button and edited by pressing the *Effects* button.

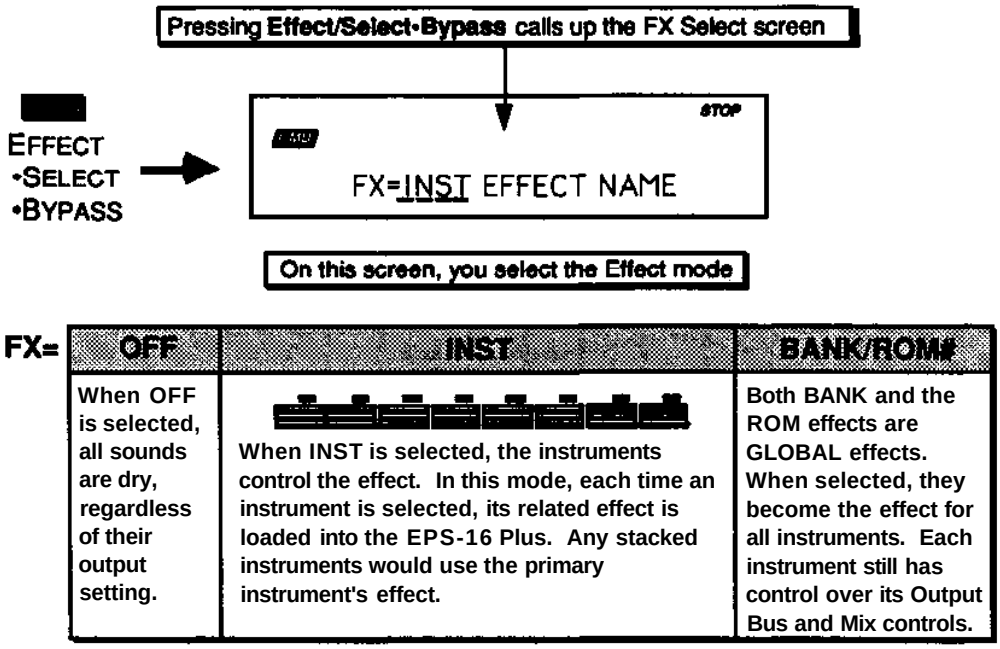
ROM Effect

In addition to the Bank Effect, which can be changed by loading in a new effect from disk or through the COPY CURRENT EFFECT command (more on that later in the section), there are an additional 13 ROM Effects.

ROM Effects are similar to the Bank Effect in that they perform globally, affecting all instruments residing in memory. However, they differ in the fact that while the Bank Effect can be replaced, the ROM Effects are stored in *Read Only Memory*, and will always reside in the EPS-16 PLUS. Even after turning off the EPS-16 PLUS, the ROM Effects will stay in memory.

The ROM Effects are displayed by pressing the *Effect/Select•Bypass* button. If you edit any of the parameters of a ROM effect, that effect is instantly copied into the Bank effect location where you can edit it as you please.

Selecting Effects



The main parameter of the EFFECT/Select•Bypass page is the effects selector. Changing this parameter causes a new effect to be selected, which in turn changes the type of parameters which will be available on the EDIT/Effects page. This parameter may also change the Effect Type, which will affect how individual instruments within the internal memory will interact with the effect (see the preceding discussion on effect types). Selecting a new effect will automatically set all of the effect parameters to their default values for the new effect. The ROM Effects, those which always reside within the internal memory of the EPS-16 PLUS, are selected here. The available ROM Effects are:

HALL.REVERB	Hall, left to right (transverse) reflections
44KHZ REVERB	A hall reverb utilizing the 44kHz playback rate
ROOM REVERB	A reverb featuring a shorter, room-like decay
DUAL DELAYS	A dual-delay with separate left and right delay times
44KHZ DELAYS	A dual delay utilizing the 44kHz playback rate
CHORUS+REVERB	Four-voice chorus combined with reverb
PHASER+REVERB	Phase shifter combined with reverb
FLANGER+REV	Hanger combined with reverb
ROT. SPKR+REV	Rotating speaker simulator with reverb and distortion
CHOR+REV+DDL	Chorus with reverb plus digital delay
CMP+DIST+REV	Compression, Distortion, and Reverb. Great for guitar and amp simulation with acoustic feedback
DIST+CHO+REV	Distortion with chorus and reverb
WAH+DIST+REV	"Volume-Wah" effect with distortion and reverb

Instruments and Banks

The complete effects setup, including the values of all effect parameters, is saved when you save an instrument. It is *also* saved with each bank. The EPS-16 PLUS is smart about switching effects, since all sound must stop for an instant when it changes effects.

When are New Effects Loaded into the ESP chip?

- When you select an instrument from one of the *Instrument•Track* buttons with FX=INST on the EFFECT/Select•Bypass page, the effect saved in that instrument will be loaded into the ESP, and you will hear the sound with its associated effect

- When you load a new bank, a new Bank effect is loaded into the ESP.

- When you load an individual effect (one that is not part of a bank or an instrument), it is loaded into the ESP and becomes the new Bank Effect.

- When you select or layer instrument/tracks with FX=BANK or FX=ROM on the EFFECT/Select•Bypass page, the effect is *not* changed.

Whenever a new effect is loaded into the ESP, the audio output will pause briefly, allowing the instructions which create the new effect to be loaded into the ESP. If an effect differs only by variation in parameter values, then this pause will not occur.

Performance Control of Tracks When Using Bank Effects

When using a bank effect, all the instruments in the internal memory are routed through the same global effect In order to gain some individual control for each instrument, two parameters on the EDIT/Track page determine how each instrument will interact with the bank effect

- OUT — This parameter determines which of the Busses the instrument will be sent through. The options are: WAVESAMPLE, BUS1, BUS2, BUS3, AUX1, and ROTATE. By using this parameter you can give individual instruments different wet/dry or multiple effect mixes. This parameters will be covered in greater detail in *Section 7— Voice Parameters.*

- EFFECT CONTROL — This parameter determines whether the controllers of a particular instrument will be routed to control the effect This is an important setting when using a bank effect; since all instruments are routed through the same effect, it could be confusing to have multiple instruments sending conflicting controller information to the effect. This parameters will be covered in greater detail in *Section 8 — Sequencer Basics.*

Programming Effects

The EPS-16 PLUS effects are highly programmable. There are several effect parameters for every effect type. The EFFECT/Select•Bypass page contains the parameter for selecting which effect will be used. This page controls how all of the other effect screens (found on the EDIT/Effects page) will be configured and displayed. When this parameter is changed, a new effect is selected which causes several important things to occur.

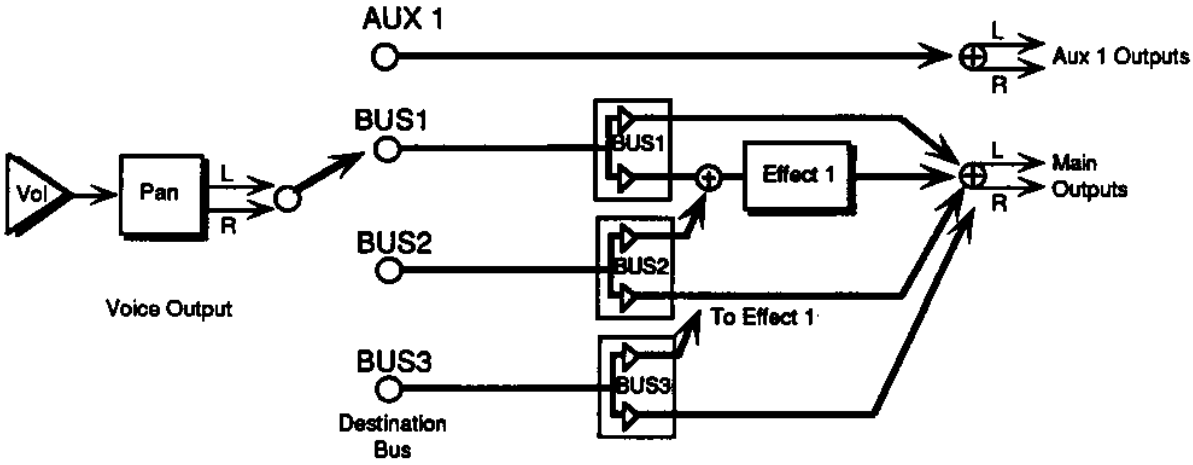
When a new effect is selected:

- a new effect is loaded, causing a brief pause in the audio output,
- the number of voices and the playback sample rate may change,
- the effect parameter screens are redefined for the particular effect selected, and
- the effect parameter values are reset to their default settings for the preset effect

The Effects Busses

The output of every voice in the EPS-16 PLUS is assigned to a stereo bus. A bus, like the bus of a mixing board, mixes together all the voices assigned to that bus into a single stereo pair. Of the four busses on the EPS-16 PLUS, three are inputs into the signal processor (BUS1, BUS2, and BUS3), and the fourth is a direct path to the AUX1 output that bypasses all effect processing (dry). The Destination Bus assignment for each Wavesample is set in the EDIT/Amp page. The voice settings in the sound can be over-ridden for each bank from the EFFECT/Select•Bypass page.

Single Function Effect Mixer



The above illustration shows the effects busses and the output mixing. Every voice is assigned to one of the four stereo busses, which go around or through the effects processing. The heavy lines are stereo paths. Some effects, such as HALL. REVERB also have a wet/dry mix of BUS3 into Effect 1.

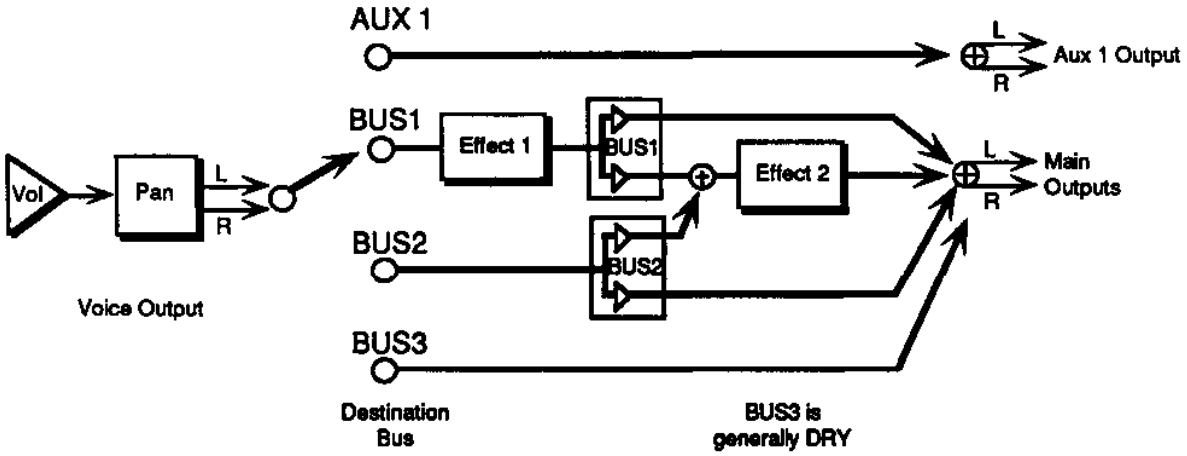
Note: BUS 2 and BUS3 are "shared" by the internal effects architecture and the BUS 2 and BUS3 outputs. They can be removed from the internal effects path if desired. See *Section 2 — System Controls* for more details.

Effects Mixing

All effects have separate mixing controls for the BUS1, BUS2, and BUS3 (when not used as a DRY path) busses. They are found on three screens within the EDIT/Effects page, and will have slightly different wording depending on the effect they're contained within.

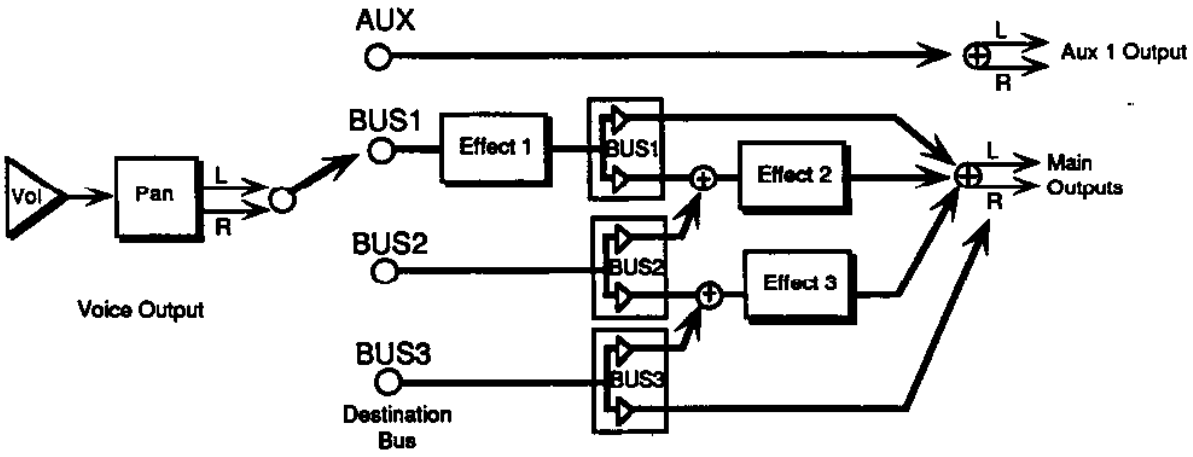
When an effect having a single processing function (such as reverb only) is selected, both busses BUS1 and BUS2 arc routed to it. When using a dual or multi-effect, BUS 1 will generally route the signal through both or all effects, with BUS2 routing only through the second effect In most cases, the BUS3 bus is reserved as a DRY path to the main outputs.

Dual Function Effect Mixer



When the selected effect is a *combined effect* that has more than one signal processing function (such as chorus and reverb), the BUS bus feeds Effect 1 and Effect 2, and the BUS2 bus feeds Effect 2 only. Within effects there may also be wet/dry mixes (such as the Chorus Mix within the CHORUS+REVERB effect).

Triple Function Effect Mixer



Some effects, such as DIST+CHO+REV, use the above mixing scheme. Effect 1 and Effect 2 usually have a wet/dry mix within them. This mixer can be configured as three independent effects, or three effects in a series.

Effect Modulators

Most of the effects allow real time control of some parameter within the effect, such as the Reverb Mix or Flanger Feedback. Each of these effects will have its own Modulator Select screen, where the modulator and mod amount are selected. This screen will look different from effect to effect, but it will always be the last screen on the EDIT/Effects page. The screen has two parameters:

- Mod Source — This selects the source for modulating the defined parameter within the selected effect
- Mod Amount — This sets the amount the Mod Destination will be modulated by the Mod Source.

The following modulation sources are available to alter the effects in performance:

Mod Source	*Modulation effect derived from*
WHEEL	the value of the mod wheel
PRESS	the channel pressure value for the selected track
PEDAL	the value of the CV/Pedal input
XCTRL	uses the value of the assignable external MIDI controller, such as the breath controller
KBD	the number of the last key played
VEL	average velocity of all keys played simultaneously
KEYDN	on when any keys are held down, otherwise off
FTSW2	uses left foot pedal of the optional SW-5 Foot Switch; on when held down, otherwise off
PATCH	four distinct values, ranging from off (no patch select buttons held) to full on (both patch selects held)
SUSTN	on when sustain pedal is held down; otherwise off
OFF	no modulation

Effect Parameters

Each of the effects has multiple screens containing a particular set of parameters associated with the effect. The first screen of parameters is very similar for all of the effects. It selects one of four Effect Variations, which feature various "preset" patches, allowing you a quick way to access several set-ups within the same effect. Subsequent screens are variable, and contain pertinent parameters that provide the flexibility for customizing the effects.

HALL REVERB; 44KHZ REVERB; ROOM REVERB

These effects algorithms provide a highly optimized studio quality stereo reverb. The BUS1, BUS2, and BUS3 parameters can be routed into the effect with different wet/dry mixes. HALL REVERB is a reverb with a relatively long decay, featuring left to right (transverse) reflections. 44KHZ REVERB is a hall reverb utilizing the 44kHz playback rate (polyphony is reduced to 13 voices). ROOM REVERB features a shorter, room-like decay.

The parameters available in these three effect algorithms are:

Decay Time
Range: 0 to 99
Controls the amount of time it takes for the reverberation to decay to a very low level (-60 dB) after the input signal stops.

Low Freq Decay — Low Frequency Decay
Range: -99 to +99
This control will boost or cut the rate at which low frequencies will decay.

Diffusion
Range: 00 to 99
This parameter determines whether the early reflections will appear as a series of discrete echoes (lower values) or will be more diffuse (higher values).

Hi Freq Damping — High Frequency Damping
Range: 0 to 99
The High Frequency Damping parameter controls the rate of attenuation of high frequencies in the decay of the reverberation. As natural reverb decays, some high frequencies tend to get absorbed by the environment. Increasing the value of this parameter will filter out increasing amounts of high frequency energy.

Hi Freq Bandwidth — High Frequency Bandwidth
Range: 00 to 99
The High Frequency Bandwidth parameter acts as a Low Pass Filter on the signal going into the reverb, controlling the amount of high frequencies that will pass into the effect. The higher the setting, the more high frequencies are allowed to pass.

Detune Rate
Range: 00 to 99
This parameter controls the LFO rate of detuning incorporated within the reverb. Detuning creates a slight pitch shift into the reverberated signal, giving it a more natural sounding decay by breaking up resonant nodes.

Detune Amt — Detune Amount
Range: 00 to 99
This parameter controls the depth of the detuning, that is, how much the pitch will change. Low values yield a metallic sound. Some voices may require very low values.

Pre-Delay (HALL Reverb only)
Range: 00 to 500
This parameter creates a delay in the amount of time it takes before the original signal is fed into the effects processor (reverb). Adjustable from 00 to 500 milliseconds.

DUAL DELAYS; 44KHZ DELAYS

A professional quality stereo digital delay. DUAL DELAYS uses the standard 30kHz (20 voice) rate, while 44KHZ DELAYS utilizes the 44kHz playback rate (polyphony is reduced to 13 voices) Both algorithms have identical parameters. BUS1 and BUS2 can have different Mix, Feedback, and Delay Time settings. BUS3 is dry.

Bus1 (and 2) Delay Mix
Range: 00 to 99
This parameter controls the mix between the original signal and the delay. Setting this parameter to 00 will allow only the unprocessed signal to be heard, while a setting of 99 will eliminate it completely, with only the delay portion remaining.

Bus1 (and 2) Feedback
Range: 00 to 99
Determines the amount of signal that will be fed from the output of the right delay back into the input, increasing the number of repeats in the delay.

Bus1 (and 2) Delay Time Left and Right
Bus1 Range: 0 to 2000
Bus2 Range: 0 to 150
Determines the amount of the amount of time between delays. Each value increases the delay time by 1 millisecond. The Left and Right channels are independently adjustable.

CHORUS+REVERB

This effect combines a four-voice chorus with the standard reverb. Assign a voice to BUS1 to get both chorus and reverb, or use BUS2 for reverb only. Use BUS3 to bypass the effect (dry).

Bus1 Rev After Chor — Reverb After Chorus
Range: 00 to 99
This parameter determines how much of the signal that is sent to BUS 1 (the chorus) will then also go to the reverb — it is a Reverb Mix for the chorused signal.

Bus2 Reverb Mix
Range: 00 to 99
This parameter controls the Dry/Wet mix of the Reverb for voices sent to BUS 2.

Reverb Decay Time
Low Freq Decay — Low Frequency Decay
Diffusion
Hi Freq Damping — High Frequency Damping
Hi Freq Bandwidth — High Frequency Bandwidth
Reverb Detune Rate/Amt
See the description under Hall Reverb.

Early Reflection Lev — Early Reflection Level
Range: 00 to 99
Controls the level of pre-echoes of the input signal added directly to the reverb output.

Chorus Rate
Range: 00 to 99
This parameter controls the four rates of modulation of the delay time of the chorus. The delay modulation produces vibrato and tremolo.

Chorus Amt — Chorus Amount
Range: 00 to 99
This parameter controls the depth of vibrato and tremolo.

Chorus Mix
Range: 00 to 99
This parameter controls the Dry/Wet mix within the chorus itself.

Chorus Feedback
Range: -99 to +99
This parameter controls the amount of feedback applied to the chorus. The sign of the value determines the polarity of the feedback. Feedback accentuates the complexity of the "swept" signal.

PHASER+REVERB

A 12-pole phase shifter with reverb. Assign a voice to BUS1 for phaser plus reverb; to BUS2 for just reverb; and to BUS3 to bypass the effect (dry).

Bus1 Reverb Mix
Range: 00 to 99
This parameter controls the Dry/Wet mix of the Phaser into the Reverb.

Bus2 Reverb Mix
Range: 00 to 99
This parameter controls the Dry/Wet mix of the Reverb.

Reverb Decay Time
Low Freq Decay — Low Frequency Decay
Diffusion
High Freq Damping
Hi Freq Bandwidth
Reverb Detune Rate
Reverb Detune Amt
See the descriptions under Hall Reverb.

Early Reflection Lev — Early Reflection Level
See the description under Chorus+Reverb.

Phase Rate
Range: 00 to 99
This parameter controls the rate of modulation of the phaser poles.

Phase Width
Range: 00 to 99
This parameter controls the amount of modulation applied to phaser poles.

Phase Feedback
Range: -99 to +99
This parameter controls the amount of feedback applied to the phaser. The sign of the value determines the polarity of the feedback.

Phase Depth
Range: 00 to 99
This parameter controls the depth of the notches created by the phasing.

Phase Center
Range: 00 to 99
This parameter controls the center of the phaser width.

FLANGER+REV

The Flanger+Reverb algorithm is similar to the Chorus+Reverb algorithm with a single LFO. Assign a voice to BUS1 to get the flanger plus reverb, and use BUS2 for reverb only. BUS3 is dry.

Bus1 Reverb Mix
Range: 00 to 99
This parameter controls the Dry/Wet mix of the Flanger into the Reverb.

Bus2 Reverb Mix
Range: 00 to 99
This parameter controls the Dry/Wet mix of the Reverb for signals sent to BUS2.

Reverb Decay Time
Low Freq Decay — Low Frequency Decay
Diffusion
Hi Freq Damping — High Frequency Damping
Hi Freq Bandwidth — High Frequency Bandwidth
Reverb Detune Rate
Reverb Detune Amt
See the descriptions under Hall Reverb.

Early Reflection Lev — Early Reflection Level
See the description under Chorus+Reverb.

Flange Center
Range: 00 to 99
This parameter controls the center of the flanger width.

Flange Rate
Range: 00 to 99
This parameter controls the rate of modulation of the flanger effect

Flange Width
Range: 00 to 99
This parameter controls the range of the high to low frequency sweep in the flanger effect

Flange Feedback
Range: -99 to +99
This parameter controls the amount of feedback applied to the flanger. The sign of the value determines the polarity of the feedback.

Flange Depth
Range: 00 to 99
This parameter controls the depth of the notches created by the flanging effect.

ROT. SPKR+REV

A rotating speaker simulation with reverb and distortion. Assign a voice to BUS1 to get rotary speaker with distortion and reverb, and use BUS2 for reverb only. BUS3 is a dry bus (no effect). There are selections on the Variations screen for the Rotary Speaker without Distortion.

Bus1 Rev After Roto — Reverb After Rotary Speaker
Range: 00 to 99
This parameter controls the Dry/Wet mix of the Rotary Speaker.

Bus2 Reverb Mix
Range: 00 to 99
This parameter controls the Dry/Wet mix of the Reverb from signals sent to BUS2.

Reverb Decay Time
Hi Freq Damping — High Frequency Damping
Diffusion
See the descriptions under Hall Reverb.

Rotor Fast
Range: 00 to 99
Determines the rate of the rotary speaker when in the "Fast" setting.

Rotor Slow
Range: 00 to 99
Determines the rate of the rotary speaker when in the "Slow" setting.

Rotor Inertia
Range: 00 to 99
Determines how long it will take for the rotor effect to speed up and slow down after switching from fast to slow or vice versa. Adjust this parameter to simulate the effect of the rotary speaker gradually picking up speed.

Fast-Slow Switch
Determines how the rotary speaker will switch between slow and fast speeds. There are several controllers that will act as the method for changing speed How they change speeds fall into two categories:

- WHEEL, PRESS(ure), PEDAL, and XCTRL — These modulation sources act like a potentiometer to turn on or off the fast rotor speed and adjust the speed to a particular level. The switch accurately reflects an actual rotary speaker, taking time to speed up or slow down, based on the value of the inertia parameter above.
- SUSTN, FTSW2, PATCH — Every time the modulation source moves from zero in a positive direction, the speaker effect changes speeds, from slow to fast or fast to slow.

Dist Gain IN/OUT — Distortion Input and Output Gain
Range: 00 to 99
The IN parameter determines the input signal gain into the amplifier simulation, creating a tube-like overdrive.

The OUT parameter controls the *output* of the amplifier distortion. There is a (fixed) clean path in parallel with the distortion. Therefore, to eliminate distortion, set this parameter to zero.

Speaker Gain
Range: 00 to 99
Controls the level of the signal (distorted or not) applied to the rotary speaker. High values will simulate a broken speaker. Also use higher settings when using little or no distortion, because the distortion raises the signal level to the speaker.

Distortion Filter
A three-pole, low-pass filter following the amplifier simulation. This parameter controls the filter cutoff, resulting in a brighter sound (for higher values) or a darker sound (low values).

CHOR+REV+DDL

Chorus with digital delay and reverb. Assign a voice to BUS1 for Chorus and Reverb, BUS2 for Reverb only, and BUS3 for Digital Delay.

Bus1 Rev After Chor — Reverb After Chorus
Bus2 Reverb Mix
Reverb Decay Time
Low Freq Decay — Low Frequency Decay
Hi Freq Damping — High Frequency Damping
Reverb Detune Rate/Amt
Chorus Rate/Amt
Chorus Mix
Chorus Feedback
See the descriptions under Chorus+Reverb.

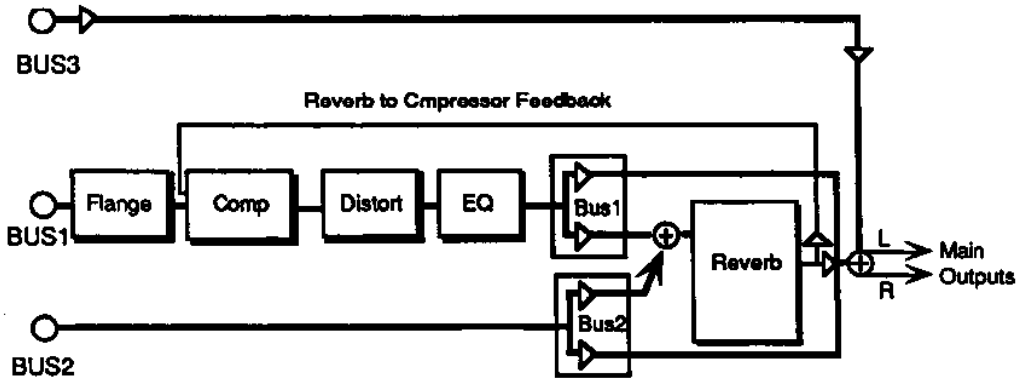
DDL Time L/R
Range: 0 to 750
This parameter determines the delay time for the left and right channels independently. Adjustable from 0 to 750 in 1 millisecond increments.

DDL Mix/Fback (Feedback)
Mix Range: 00 to 99
Feedback Range: -99 to +99
DDL Mix determines the Dry/Wet mix of the Digital Delay. The DDL Feedback parameter controls the amount of feedback applied to the Digital Delay. The sign of the value determines the polarity of the feedback. The feedback comes from the right delay line only.

CMP+DIST+VERB

A screaming guitar+amp simulator that features not only compression, distortion, and reverb, but flanging and EQ as well BUS1 routes the signal through each of these effect processors, while BUS2 is used for reverb only. BUS3 is dry.

CMP+DIST+VERB Signal Routing



Bus1 Rev After Dist — Reverb After Distortion
Bus2 Reverb Mix
Reverb Decay Time
Hi Freq Damping — High Frequency Damping
See the descriptions under Hall **Reverb.**

Compressor Threshld — Compressor Threshold
Range: 00 to 99
This parameter controls the threshold level for the compressor. As the input signal dies away below the threshold, the compressor will increase the gain of the system, causing feedback to increase as well. Normal compression is "72."

Dist Gain — (In and Out)
Range: 00 to 99
These two parameters control the levels going into and coming out of the distortion effect For more distortion, use a high input level and turn the output level down to keep the volume under control. For less distortion, use a low input level and a higher output level.

Dist LPF/HPF — Low Pass Filter/High Pass Filter (Equalizer)
Range: 00 to 99
The Dist LPF parameter filters out high frequencies after the distortion signal path. The lower the value, the less high frequencies pass through. The Dist HPF parameter filters out low frequencies after the distortion signal path. The higher the value, the less low frequencies pass through.

Dist Flange Rate
Range: 00 to 99
This parameter controls the rate of modulation of the notches due to the flanger effect A setting of 00 effectively turns the flanger off.

System Feedback
Range: -99 to +99
This parameter controls the amount of signal applied from the output of the reverb back into the input of the compressor. The sign of the value determines the polarity of the feedback.

Note: Since the feedback level is taken from BUS1, if BUS1 is set to 00 or a low value, feedback will have little or no consequence. Also, it is important to note that since the signal is being taken from the reverb, which is also fed by BUS2, voices sent to BUS2 will enter the feedback loop along with the BUS1 signals.

DIST+CHO+REV

A brighter guitar+amp simulator that features distortion, chorus, and reverb, but without the compressor. The three effects can be run either in a series or in parallel, depending on how the three BUS parameters are set This effect uses the triple effect mixing scheme shown earlier in this section.

Bus1 Dist Into Chor Mix — Distortion Into Chorus Mix
This parameter determines how much of the output from the distortion bus will be fed into Bus 2 for added chorusing. Setting this parameter to 00 will cause the output from the distortion bus to go directly to the main outputs.

Bus2 Chor Into Rev Mix — Chorus Into Reverb Mix
This parameter determines how much of the output from the chorus bus will be fed into Bus 3 for added reverb. Setting this parameter to 00 will cause the output from the chorus bus to go directly to the main outputs.

Bus3 Reverb Mix
Sets the wet/dry mix of **the reverb.**

Dist Gain — (In and Out)
See the description under CMP+DIST+REV.

Dist Filter FC — Filter Cutoff
Range: 00 to 99
This determines the filter cutoff frequency (brightness) of the distortion. For a complete description of filters, see *Section 7 — Voice Parameters.*

Dist Filter Q — Resonant Peak
Range: 01 to 25
This parameter determines the level of the resonant peak at the filter cutoff point. While the FC (filter cutoff) parameter determines where (at what frequency) this peak will occur, the Q setting controls the presence of the peak.

Distortion Mix
Range: 00 to 99
Determines the wet/dry, or in this case, dirty/clean mix of the signal. A value of 00 gives a clean signal; 99 yields an all-distortion signal.

Reverb Decay Time
Low Freq Decay — Low Frequency Decay
Hi Freq Damping — High Frequency Damping
Hi Freq Bandwidth — High Frequency Bandwidth
Reverb Decay Rate/Amt
See the descriptions under HALL REVERB.

Early Reflection Lev
Chorus Rate/Amt
Chorus Mix
See the descriptions under CHORUS+REVERB.

WAH+DIST+REV

A final guitar+amp simulator, this time featuring distortion, compression, reverb, and a resonant filter following the amplitude of the signal. Think of this as the "Jerry Garcia" setting. Assign a sound to BUS1 for Wah distortion and reverb; use BUS2 for reverb only. BUS3 is dry.

Bus1 Rev After Dist — Reverb After Distortion
Bus2 Reverb Mix
Reverb Decay Time
Hi Freq Damping — High Frequency Damping
See the descriptions under HALL REVERB.

Wah Filter Center
Range: 00 to 99
Determines where the resonant peak of the wah will occur. Higher values create a higher pitched wah.

Wah Filter Range
Range: 00 to 99
Controls how much depth the wah will have. This is analogous to how far you move a wah-wah pedal back and forth.

Compressor Threshld — Compressor Threshold
Dist Gain — (In and Out)
System Feedback
See the descriptions under CMP+DIST+REV.

COMMAND/Effects Page

- The commands on this page allow you to copy and save effects.



This parameter is used to save the bank effect to disk (or hard drive) as a separate file which can be reloaded at any time. Only the bank effect can be saved directly to disk; conversely, when you load an Effect file from disk, it is always loaded into the Bank Effect location. If you wish to save, as a separate effects file, either a ROM effect or an Instrument effect, you must first copy the effect into the bank effect (see below) and then save it

- Select SAVE BANK EFFECT.
- Press *Enter•Yes.* The display shows the filename associated with the current Bank effect. You can rename the effect using the arrow buttons and the data entry slider if you wish.
- Press *Enter•Yes.* The EPS-16 PLUS then saves the effect file to disk.



This command is used to copy an effect either from the bank to an instrument, or the other way around. It can also be used to copy one of the ROM effects onto an instrument or the bank. The effect that is copied (the source effect) is always the one you are currently hearing.

- Select COPY CURRENT EFFECT.
- Press *Enter•Yes.* The display shows the DIRECTION parameter. Using the *Up/Down Arrow* buttons, select either COPY TO BANK to take the effect from the currently selected instrument and copy it into the bank, or COPY TO INST to take the effect currently in the bank location and copy it to one of the instruments in the internal memory.
- Press *Enter•Yes.* If you've selected COPY TO BANK in the previous step, the display will briefly read COMMAND COMPLETED and the procedure will be done. However, if COPY TO INST was selected, use the *Instrument•Track* buttons to indicate into which instrument you wish to copy the bank effect. Once the destination instrument has been selected, press *Enter•Yes.*

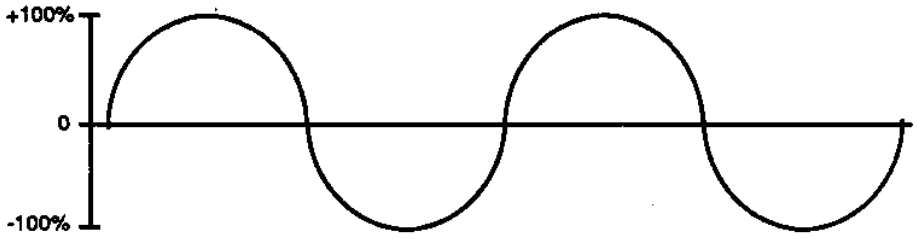
Section 5 — Sampling

What is Sampling? 5-1
Sample Rate 5-2
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Getting Ready to Sample 5-4
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Looping 5-12
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What is Sampling?

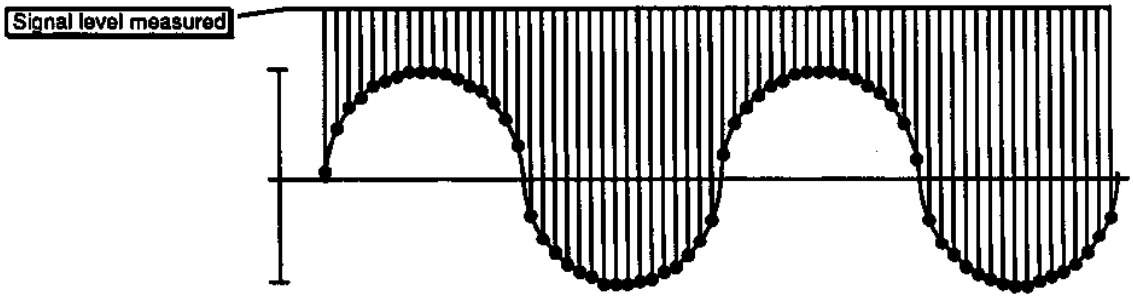
Before getting into talking about samples and sampling, let's begin with a simple explanation of sound. A sound begins as a series of vibrations, or pressure waves, in the air. When these vibrations reach the diaphragm of a microphone, they cause it to move back and forth. This creates a fluctuating electrical signal which rises and falls around a center, or zero line.

A simple sound wave, once it has been converted into an electrical signal, might look like this:



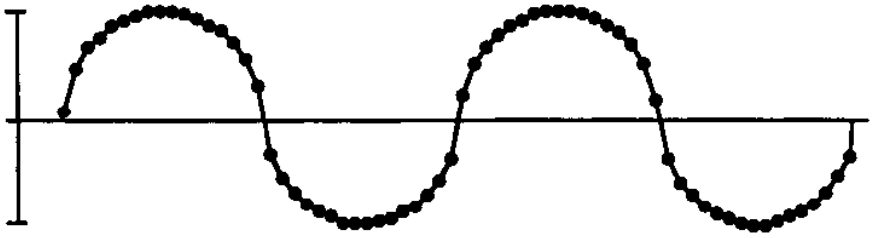
A conventional analog tape recorder would record this signal by converting the electrical fluctuations into magnetic fluctuations and then imprinting a continuous (or "analog") copy onto the magnetic surface of the tape.

A digital sampling system, such as the EPS-16 PLUS or a digital tape recorder, works a little differently. When you digitally record the sound, the level of the signal is measured (or "sampled") thousands of times per second, and each number is recorded as a number in memory. If the same signal that was shown in the analog recording illustration were recorded digitally, it would look like this:



The digital sampler does not record the actual sound but rather a series of discrete numbers, each of which represents the level of the signal at a given instant in time.

On playback, the EPS-16 PLUS reconstructs the original signal by "connecting the dots," producing an output voltage which corresponds to the numbers in its memory (shown below). This voltage can then be amplified and sent to speakers, which turn it back into pressure waves in the air so that we can hear it.



Sample Rate

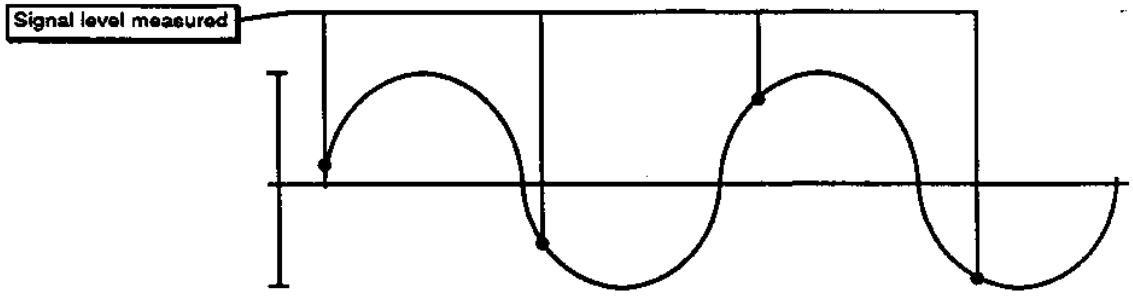
The sample rate determines how often the signal is measured (that is, how close together the dots would be in the illustration above). A sample rate of 30 KHz, for example, means that we are sampling the signal 30,000 times each second. A higher sample rate will yield a more accurate picture of the waveform and better high frequency response. But keep in mind that a higher sample rate also will use up the EPS-16 PLUS memory more quickly, since you are generating more numbers per second that have to be stored in that memory.

The EPS-16 PLUS can sample at any of seven different sample rates, from 11.2 KHz (11,200 samples per second) to 44.6 KHz (44,600 samples per second). To give you some frame of reference, Compact Discs are recorded at 44.1 KHz, Digital Audio Tape (DAT) at 48 KHz. You can adjust the EPS-16 PLUS sample rate by scrolling one step to the right after entering sample mode (see the discussion later in this section).

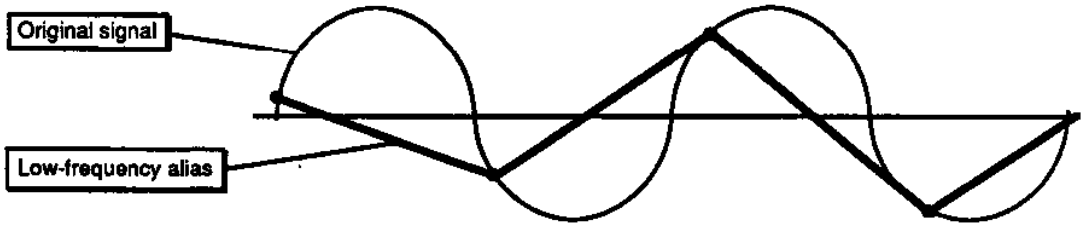
Aliasing

A digital sampler can only accurately record frequencies up to one half that of the sample rate. This frequency (half the sample rate) is known as the *Nyquist frequency,* after the fellow who figured that out. Trying to sample sounds that contain frequencies above half the sample rate will result in *aliasing,* the creation of false (or "alias") low-frequency tones, when playing the sound back.

Suppose we were to sample the wave from our previous example at a much lower sample rate (fewer times per second), like this:



When the EPS-16 PLUS tries to reproduce this sound (to connect the dots, as it were) the resulting wave bears litle resemblance to the original, because there are not enough sample points to accurately recreate it:



To prevent aliasing, the EPS-16 PLUS has a variable input (or "anti-aliasing") filter which removes frequencies above a cutoff point before the signal reaches the sampling circuitry. Whenever you change the sample rate, the EPS-16 PLUS automatically adjusts its input filter to the highest suitable cutoff frequency for that rate. You can, however, change it manually if you want a higher or lower setting. (From the sample rate parameter, scroll right to select FILTER CUTOFF =###.)

Getting Ready to Sample

Here are a few things you can do before sampling anything that will result in your getting better quality samples.

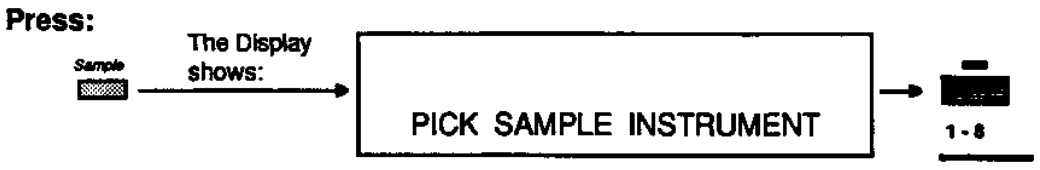
- Start with the cleanest possible signal — This may seem obvious, but a sample (or any recording) can only be as good as the original signal, so you should pay attention to the signal path. For example, if you are feeding the audio input of the EPS-16 PLUS from a mixer, using a direct out from the individual channel is better than using an auxiliary send because there are fewer preamps (and thus less noise) in the chain. If you do use an auxiliary or a main send, make sure only the channel(s) you intend to sample are turned up in that send.

- Record the sound on tape and sample from the tape — This is not always possible, but it tends to yield better results because now the sound is repeatable. This is important when adjusting the input level—before sampling you can play the sound as many times as necessary, watching the meter and adjusting the level of the signal into the EPS-16 PLUS, until you have just the right level—high enough to get the best possible dynamic range, yet low enough to avoid clipping. The other good reason for sampling from tape also has to do with repeatability. Suppose you are sampling a horn section live, directly into the EPS-16 PLUS, and suddenly they play that one excruciatingly perfect note that you've been waiting for all your life. But after making the sample you discover that the input level was a little too high and the sample is clipped Or you want to put a slightly different EQ on it, or maybe some reverb. Unfortunately, you will never get them to play that note just the same way again, so the moment is lost. If you had it on tape you could simply make your adjustments and sample it again.

Easy Sampling

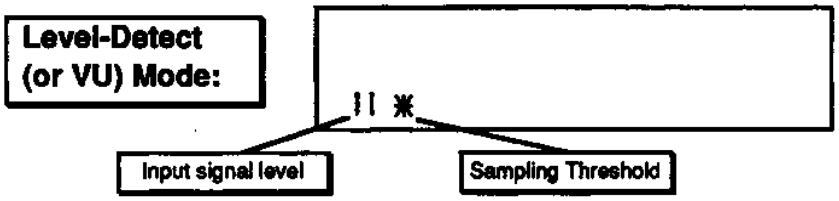
Let's try a simple one-shot sample. First we need a source — a microphone, synthesizer, the output of a mixer, etc. That sound source should be connected to the Audio In jack of the EPS-16 PLUS. Note that the EPS-16 PLUS has no separate level control on the input The level of the signal coming into the EPS-16 PLUS must be adjusted at the source.

The EPS-16 PLUS' Audio Input can be switched to accept a *line-level* signal (such as that from a mixer or a synthesizer), or a *mic-level* signal (from a microphone). This is set after you enter the Level-Detect mode. To initiate sampling:



- Press the *Sample* button.
  The EPS-16 PLUS must access the Operating System disk at this point to load the sampling routine. If the disk in the drive doesn't contain the Operating System (or if there's no disk in the drive) the display will say LOAD OS DISK - HIT ENTER. Put the O.S. disk into the drive and press *Enter•Yes.*
  The display says PICK SAMPLE INSTRUMENT.

- Press an unused (no LED) *Instrument•Track* button.
  (If you select an Instrument location where there is already an instrument loaded, the EPS-16 PLUS goes to a Resampling screen. Don't do that yet)
  The EPS-16 PLUS goes into Level-Detect (or VU) mode:



In Level-Detect mode the display acts like a peak-reading VU meter, the vertical bars on the display lighting from left to right to show the level of the incoming signal. The *star* represents the sampling threshold — the EPS-16 PLUS will not begin recording until the signal crosses this level. The Sampling Threshold provides a way to make the EPS-16 PLUS "wait" until the signal reaches a certain level before it begins to record. Pressing the *Up Arrow* button raises the threshold; pressing the *Down Arrow* button lowers it.

When the sampling threshold is set to minimum (the star all the way to the left of the display) the EPS-16 PLUS will begin sampling as soon as you hit *Enter•Yes.* The higher (further to the right) you set the threshold, the higher the input signal will have to be before the EPS-16 PLUS begins recording. By adjusting the threshold, you can avoid recording a lot of empty space (silence) at the beginning of your sample.

Before you proceed, there are a number of sampling parameters you can adjust. These parameters are accessed by pressing the *Left/Right Arrow* buttons while in Level-Detect mode. These parameters are:

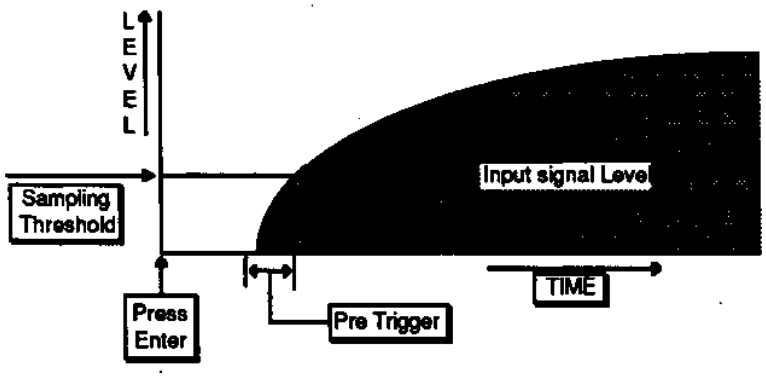
- SAMPLE RATE — This is the input sample rate. It determines how many times per second the EPS-16 PLUS will sample the sound. Now press the *Right Arrow* button again and you will see:

- FILTER CUTOFF — This is the cutoff frequency of the anti-aliasing input filter. This very steep filter gets rid of everything above the Cutoff Frequency. Whenever you change the SAMPLE RATE (above) the EPS-16 PLUS automatically resets the FILTER CUTOFF to its optimum value for that sample rate, so you don't usually need to adjust this parameter at all. Press the *Right Arrow* button again:

• PRE TRIGGER — This lets the EPS-16 PLUS start the sample *before* the sampling threshold is reached. The problem with using a high sampling threshold is that you can sometimes chop off low-level information at the beginning of the sound (below the threshold), making it sound clipped and unnatural. That's where the Pre Trigger parameter comes in.

The EPS-16 PLUS initially records the sample into a "buffer memory" of up to 127 milliseconds (a little over one tenth of a second). You determine the length of this buffer with the pre trigger amount, found by scrolling three steps to the right from the level-detect screen. Now when you press *Enter•Yes*, you get the benefits of a higher threshold without chopping off the beginning of the sound.

After the sampling threshold is reached, the EPS-16 PLUS will "back up" the SAMPLE START by the amount of the time selected in the PRE TRIGGER parameter. This allows sound just below the threshold level (which would otherwise be lost) to be retained, as shown below:



A pre-trigger amount of 10 to 20 ms should be adequate in most cases. You could set it higher to ensure that you don't miss any of the sound, or when using a very high sample threshold. In any case, a litle silence in front of the sound is better than clipping it short, because you can later move the sample start forward to eliminate the dead space, and then truncate the Wavesample.

• INPUT LEVEL= MIC/LINE — Here you select either MIC-level (for when a microphone is connected directly to the Audio In) or LINE level (for the output of a mixer, pre-amp, synthesizer, etc). Make sure it is set appropriately for your current needs. Press the *Right Arrow* button again:

• SAMPLE TIME — This tells you how much sampling time is available, taking into account the current Sample Rate and the amount of free Internal Memory. It is a read-out only and can not be adjusted (though changing the sample rate will cause this number to change).

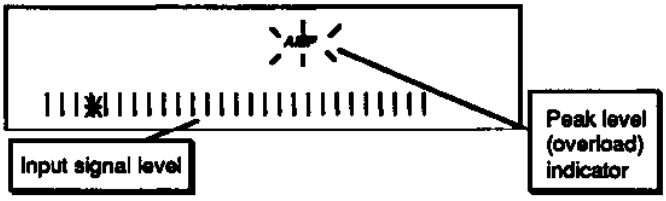
• Press the *Right Arrow* button once more to return to Level-Detect mode.

Setting the Input Level

As mentioned previously, optimizing the input level is crucial in sampling. Record at too low a level and you don't utilize all the bits of resolution that are available in the system—the sample will be too quiet and overly noisy. Record at too high a level and you will introduce clipping, which tends to be extremely harsh and unpleasant. For the sake of this and the examples that follow, we will assume that you are using an input signal from a repeatable source, such as a tape player, record, CD or synthesizer, whose level you can adjust.

- Play the signal into the EPS-16 PLUS. Watch the display to see if the AMP indicator lights (this light indicates overload, or clipping). If it does light, turn the signal down a bit. If the AMP indicator does not light when you play the sound, turn the signal up a little. Now play the sound into the EPS-16 PLUS again, watching the indicator and adjusting the signal accordingly.

- Repeat this until you have found the point just barely *below* where the AMP indicator lights. This is the optimum recording level. With a little practice you can quickly get a good level every time.



Once you have the level adjusted:

- Press *Enter•Yes*.
  The alphanumeric display goes out and the REC indicator above the display lights while the EPS-16 PLUS is sampling. Remember that if the threshold is set higher than 0, the EPS-16 PLUS will not begin actually sampling until the input signal crosses the threshold

- Play the sound to be sampled; play the synth, start the recording, or speak into the mic.

- Press *Cancel•No* to stop sampling.
  Or, if you don't stop it by pressing *Cancel•No* or the foot switch, the EPS-16 PLUS will continue sampling until it has used up all the available memory.

- Play the Root Key.
  After you have pressed *Cancel•No* to halt sampling (or the memory is full) the display flashes PLAY ROOT KEY. The Root Key is the note on the EPS-16 PLUS keyboard from which the sample will play back at "unity" — the same pitch as the original input signal. So whichever key you press on the MIDI keyboard connected to the EPS-16 PLUS in response to the PLAY ROOT KEY prompt is the key that will play back exactly what you sampled.

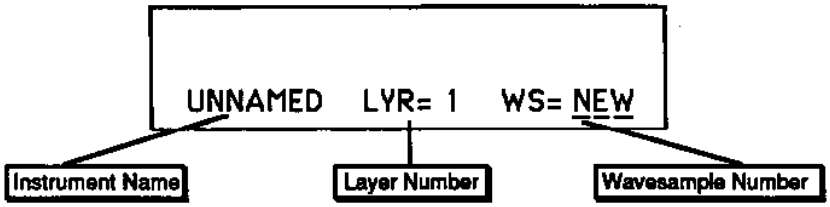
Multisampling

Many sounds require that you make more than one sample, with each sample covering a different range of the instrument. This is because if you transpose a sound too far (up or down) from its original pitch it begins to sound unnatural. Another application for making multiple samples is when you are sampling something like a drum set, where you want several entirely different sounds on the keyboard at once.

The EPS-16 PLUS makes it easy to "multisample" — which is what we call this process of making several samples within one Instrument

- Make your first sample as described above in "Easy Sampling."
- Press the *Sample* button.
  The display reads PICK SAMPLE INSTRUMENT.
- Press the *Instrument•Track* button of the instrument you just sampled.

When you select an existing instrument in response to the PICK SAMPLE INSTRUMENT prompt, the EPS-16 PLUS shows the multisampling screen:



Here you see:

- The first nine letters of the instrument name (which is always UNNAMED INST for newly sampled sounds);
- The number of the current layer, and
- Which Wavesample will be sampled after you press *Enter•Yes.* The default here is NEW, meaning that a new Wavesample will be created in the same layer of the instrument

- Press *Enter•Yes.*
  This puts you back in Level-Detect mode. Now proceed to sample the new Wavesample just as you did the first one:
- Adjust the incoming level so that it doesn't clip.
- Press *Enter•Yes* to commence sampling.
- Play the sound to be sampled.
- Press *Cancel•No* to stop sampling.
- Play the new Root Key — the key at which you want the new sample to play back.

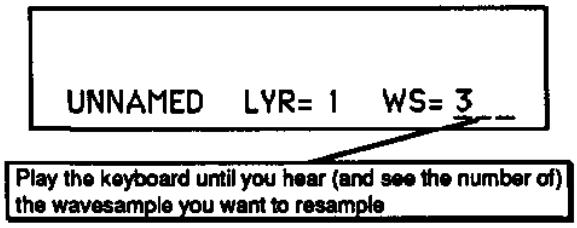
Once you have assigned a Root Key to the new sample, the EPS-16 PLUS automatically adjusts the split point to be midway between the Root Keys of the two samples.

Follow the exact same procedure to continue making multiple samples within the instrument.

Resampling an Existing Sample

Let's suppose you have made four multisamples of some instrument, and you now want to go back and redo the third one. The procedure is almost the same as that for making a new multisample, except that instead of pressing *Enter•Yes* while WS=NEW you will first pick one of the existing Wavesamples by selecting it from the MIDI keyboard connected to the EPS-16 PLUS.

- Press *Sample,* then select the instrument into which you want to sample.
  The multisampling screen appears as before.
- Move the cursor (underline) to WS =__
  The cursor should be beneath the Wavesample select (WS=__). If it's not, use the *Right Arrow* button move it there.
- Play a note on the MIDI keyboard connected to the EPS-16 PLUS to select the Wavesample to redo.
  As you play notes you will see the word NEW replaced by the number of the Wavesample you are hearing. As you play different notes the Wavesample number is updated. When you hear the one you want to resample, and see its number on the display, it is selected to be resampled. Or you can scroll to the Wavesample number you want to resample using the *Up/Down Arrow* buttons.



- Press *Enter•Yes* and continue with sampling as before.
  The original Wavesample will be erased, replaced by the new one.

When you resample an existing Wavesample the EPS-16 PLUS will preserve the keyboard range, all Wavesample parameters (envelopes, etc.) and, when possible, the loop points of the original sample.

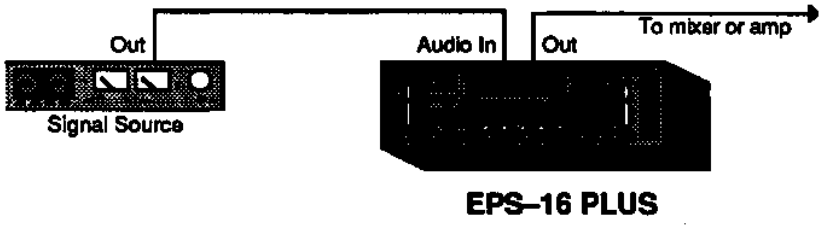
Note: This method of resampling should not be confused with the RESAMPLE WITH EFFECT parameter, located in the COMMAND/Wave bank. That function is described in detail in *Section 6 — Wavesample Parameters*.

Using Equalization

Probably the single most valuable tool for shaping a sampled sound is a good equalizer. Best for this purpose is a parametric EQ that allows precise control over center frequency and bandwidth, but excellent results can be obtained with a 10- or 27-band graphic EQ, or even with the channel EQ on a mixing console.

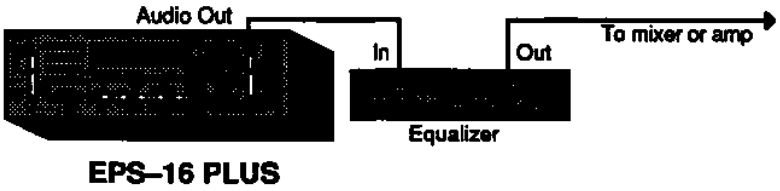
Often a sound contains some overtones or harmonics which sound normal on one note but unnatural when transposed over a range on the keyboard. Or it might be necessary, when trying to match up the different samples in a multisampled sound, to apply some drastic EQ to one or more of those samples. The answer is to equalize the signal on the way into the EPS-16 PLUS. Here's a little trick for finding the proper EQ settings (again, we assume a repeatable signal source such as a tape, *CD* or synthesizer):

First, sample the sound flat, without any EQ or other processing:



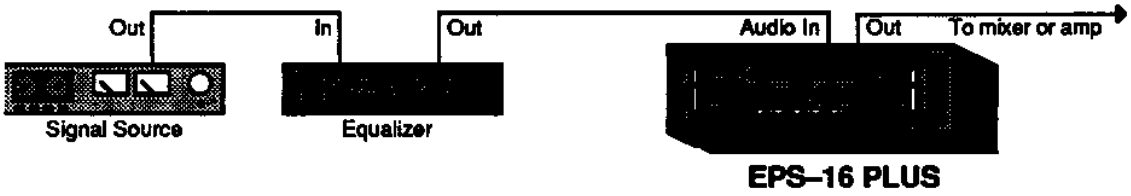
Play the sample on various notes, listening to the overall tonal balance — does it need some added highs, or perhaps a little less midrange, etc. Listen particularly for frequencies that seem to stand out unnaturally when the sound is transposed.

Now connect the equalizer between the audio output of the EPS-16 PLUS and the mixer or amplifier



Play the root key of the new sample (it's very important that you play the root key during this process so that you'll be equalizing exactly the pitch you sampled). While playing the root key, adjust the equalizer, zeroing in on the problem areas and cutting or boosting those frequencies, until the sample sounds just the way you want it to.

Next, *without changing any of the settings on the equalizer,* repatch so that the equalizer is between the signal source and the EPS-16 PLUS Audio In:



Sample the sound again (you probably will need to re-adjust the input level first). The EQ curve you set up in the previous step is now "built into" the sample, and it should sound just as it did when you were playing it through the equalizer. If you find that you have boosted or cut any given frequency too much, just change the EQ settings slightly and sample the sound again. With a little practice you will be able to identify quickly problem frequencies and EQ them out using this method.

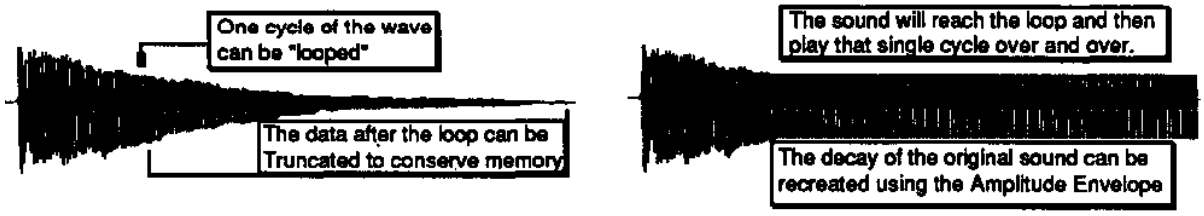
Looping

One of the fundamental challenges of sampling is to make efficient use of the sampler's memory. You simply cannot sample the entire duration of every event. Plus, you usually want a sound to continue playing as long as you're holding the key down, regardless of how long the original event was. This is why we employ *Looping*.

When we loop a segment of sound, what we are doing is playing through to the end of the looped segment and then instantly starting back at the beginning of the loop, as if playing one continuous sound. It's a lot like a tape loop—a segment of recording tape with the two ends spliced together so that it cycles repeatedly.

Consider that a low note on a grand piano can last 30 seconds or more from the time the key is struck to the time it decays into silence. Sampling this entire event does not make sense because:

- You could use up all your sampling memory (and then some) on one note, leaving no memory for multisampling; and
- After the initial attack transients die down, the sound of the piano string settles into what is essentially a repeating waveform. This means that you can select one cycle of this repeating waveform and *loop* it (play it over and over). All the data after the loop can then be removed (truncated) because you don't need it. This conserves memory.



A piano, solo violin, guitar, or woodwind are all sounds which you could loop in this way. However, there are other sounds which do not settle into a repeating waveform. A full pipe organ, string section or a choir would be good examples of such sounds. These sounds remain extremely complex throughout their duration. Using a single-cycle loop on a choir sample would cause the sound to suddenly become very static and one dimensional when it reaches the looped section. These complex, ever-changing sounds require that we employ longer loops—repeating a large segment of the sound rather than just a single wavecycle.

Generally, successful loops fall into one of two categories—single-cycle loops, which we refer to as short loops, and loops of about a second or more, which we call long loops. Which type to use depends on the sound. If the sound settles into something relatively static, use a short loop. If the sound is composed of many elements which constantly chorus and interact with each other over time, you will need to use a long loop.

Auto-Loop Finding

When you loop a sample, it is important that the beginning and end of the loop "match up" to form a continuous waveshape—otherwise the loop will pop or click each time it reaches the splice point. For this reason, the best loop points are those which occur where the wave crosses the zero line (called a "zero crossing") and where the direction of the wave at the loop start matches that at the loop end.

The EPS-16 PLUS has a system parameter called AUTO-LOOP FINDING which, when ON, allows you to choose only loop start and loop end points which meet these criteria.

Press *Edit*, then *System•MIDI*, and scroll until the display shows AUTO-LOOP FINDING = ##. Make sure it is set to ON. Now, whenever you move the loop start of any Wavesample, the EPS-16 PLUS will automatically jump to the next zero crossing which matches the wave direction at the loop end, and vice versa. This does not, in itself, guarantee a good loop but it will save you lots of time and trouble by ruling out all those splice points which definitely *won't* work.

Short (Single-Cycle) Loops

As discussed previously, a short (single-cycle) loop is appropriate when the sustain portion of the sound is a more-or-less repeating wave. The best way to find out if a short loop is right for a given sound is to try it and see if it works. (If fact, the best way to learn about looping generally is to experiment with moving both the loop start and the loop end around in a Wavesample and listening to the results.)

There is a simple technique for finding a short loop. For this example we will sample some sound with a simple sustain, such as a clean guitar or bass sound, or a synth patch without a lot of chorusing.

First press *Edit*, then *System•MIDI* and make sure AUTO-LOOP FINDING=ON.

Next connect the signal source to the EPS-16 PLUS Audio In, set the input level, and sample the sound. After you have played the root key to conclude the sampling process, the EPS-16 PLUS puts you on the EDIT/Wave page which, happily, is just where you want to be in order to turn the loop on.

- Press the *Up Arrow* button twice to select MODE=LOOP FORWARD. Now hold down a key and listen to the sound. The default settings for a new Wavesample are LOOPSTART=00%, LOOPEND=99%, meaning that the whole sample is currently looping over and over.

- Scroll right to the loop start parameter, underlining the coarse adjust (the number to the right, in parentheses). Use the *Data Entry Slider* to move the loop start up, past the beginning of the sound. Try a setting of (25) to start This puts the loop start 25% of the way into the Wavesample. Play the sound and listen.

- Scroll right to the loop end parameter, again underlining the coarse adjust (the number in parentheses) which should be at (99). Use the *Data Entry Slider* to move the loop end down as far as it can go. It will stop at (25) or wherever you set the loop start to, because you cannot adjust the loop end past the loop start The loop start and loop end are now at the same place in the Wavesample. Play the sound. When it hits the loop, it will play supersonic frequencies because the EPS-16 PLUS is trying to loop on just one sample.

- Scroll two steps to the left to select the loop end fine adjust (the number just after LOOPEND=). Press the *Up Arrow* button once and play the sound. The pitch of the loop should be a little lower —you have moved the loop end away from the loop start to the first potentially good splice point.

- Press the *Up Arrow* button again and listen to the sound. With each press of the *Up Arrow* button, the pitch of the loop should go down as the EPS-16 PLUS moves the loop end to the next zero crossing. Keep pressing the *Up Arrow* button, one press at a time, until the loop sustains at the same pitch as the sound before the loop. This is a single-cycle loop.

- After you've found a good loop, you should move the sample end back to the same point as the loop end, then truncate the Wavesample to reclaim the memory of the loop which is no longer needed. (TRUNCATE WAVESAMPLE is found on the COMMAND/Wave page and is discussed in *Section 6— Wavesample Parameters.)*

Adjusting Loop Position

Prior to truncating the Wavesample, you may decide that the loop occurs too early in the sound (before all the attack transients have died down) or too late (wasting memory). The EPS-16 PLUS has a way to move the whole loop (start and end) around while keeping its relative length intact

- While still on the EDIT/Wave page (press *Edit*, then *Wave* if you are not) scroll until the display shows LOOPPOS= ## (##). This is the loop position parameter. The number shown here is that of the loop start, but adjusting this parameter will move both loop start and loop end together, leaving the length (and thus the pitch) of the loop unaffected

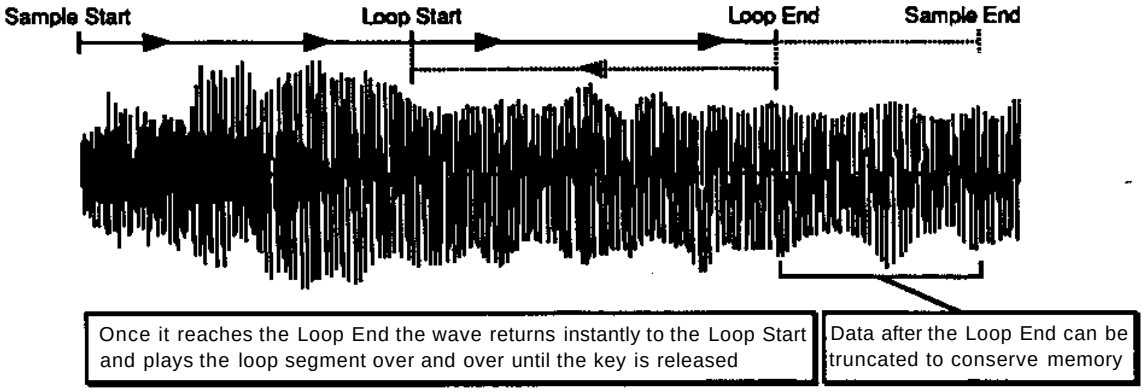
- Underline the loop position coarse adjust (the number in parentheses) and try moving the loop position around while listening to the sound. Find the place where the loop works most naturally with the rest of the sound. Note that you might have to readjust the loop end slightly after moving the loop position, particularly if the sound has pitch variations in it.

- Again, once you've found a loop you like, move the sample end back to the loop end, and truncate the Wavesample.

For more on this parameter, see *Section 6 — Wavesample Parameters.*

Long Loops

If a single-cycle loop doesn't work for a particular sound, try a longer loop. The idea is the same—a segment of the sound is repeated again and again—but the long loop encompasses many cycles of the sound. Long loops retain the tonal complexity and sense of "movement" in the original sound, and will therefore work better for sounds like vocals, strings, flutes, stacked synth sounds, etc.



There is no one simple procedure for getting a perfect long loop every time—it all depends on the sound. Some sounds are easy to loop; other sounds seem to defy all attempts to find a good loop. Especially difficult to loop are those sounds whose timbre and volume change radically over time. You'll find, however, that the EPS-16 PLUS provides a wide variety of tools for getting the best possible results with even the most difficult sounds. By following the guidelines below (and not being afraid to experiment) you should be able to get an acceptable loop on virtually any sample.

- The AUTO-LOOP FINDING parameter should be on when looking for a long loop.
- Sample a sound, play the root key, and set the loop mode to MODE=LOOP FORWARD.
- Scroll to the LOOP START parameter, underlining the coarse adjust (in parentheses), and move the loop start forward past the initial attack of the sound. Try starting with a value somewhere between 15 and 40 percent Hold down a key and listen to the loop.
- Scroll to the LOOP END parameter, again underlining the coarse adjust. While holding down a key, use the *Data Entry Slider* to move the loop end back towards the loop start. The closer to the loop start it gets (that is, the shorter the loop) the more noticeable the loop will sound. The idea is to find the shortest possible loop (to conserve memory) which doesn't sound obviously "looped."
- While holding down a key you can scroll back and forth between the LOOP START and LOOP END, changing the coarse and fine adjust for each, listening to how different parts of the sound loop.

- Most often you will find a loop which works fairly well except that the splice point is noticeable. In this case, try performing one (or more) of the cross-fades contained on the COMMAND/Wave page. Cross-fading can smooth out the timbral differences between LOOP START and LOOP END, making the transition less abrupt See *Section 6 — Wavesample Parameters* for more details.
- A loud bump or "pop" at the splice point usually indicates a volume difference between loop start and loop end Try VOLUME SMOOTHING the loop (see *Section 6 — Wavesample Parameters)* before doing a cross-fade.
- Again, once you have a good loop, move the sample end back and then truncate the Wavesample.

Section 6 — Wavesample Parameters

This section covers those functions which can be edited independently for each individual Wavesample within the instrument

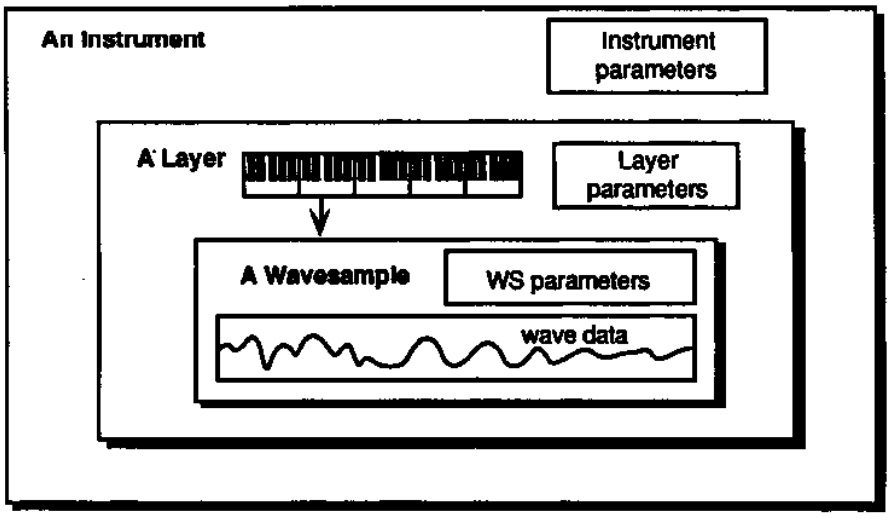
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About Wavesamples

The Wavesample is the most basic level of sound within the EPS-16 PLUS. A Wavesample can be anything — a drum, a note on a piano, a sound effect, your voice. Each Wavesample will have its own set of parameters pertaining to the wave and the voice architecture Several of these Wavesamples can be grouped together to form *Layers*, and up to eight of these layers can reside within an instrument.

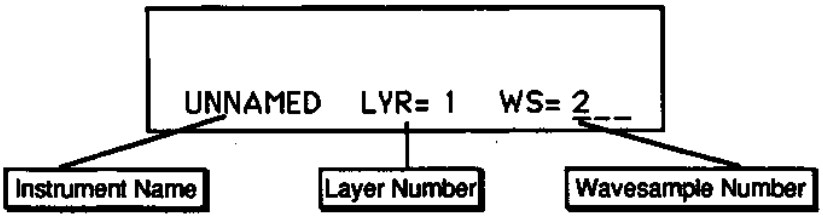


This section will cover the parameters and commands that relate directly to the Wavesamples. Things like determining the Wavesample length and playback direction, volume commands, and looping are discussed here. More refined voice parameters, what might be referred to as "synthesizer programming" types of features, will be covered in the next section.

Selecting a Wavesample or Layer for Editing

In these next two sections of the manual, all the tools available for shaping a raw Wavesample will be covered. Almost all of these parameters and commands will require you to select either a Wavesample or layer for editing. The procedure for doing this is quite simple. With the instrument selected that contains the Wavesample or layer you wish to edit:

- Press the *Edit* button. The EPS-16 PLUS responds with the following screen:



Here you determine the current instrument, layer, and Wavesample.

- Move the cursor (underline) to WS =__. The cursor should be beneath the Wavesample select (WS=_). If it's not, use the *Right Arrow* button move it there.

- Play the MIDI keyboard connected to the EPS-16 PLUS to select the Wavesample you want to work on. When you play the keyboard, the Wavesample number showing on the display will change as you as you play different Wavesamples. Whichever one is showing is considered the current Wavesample — the one which will be affected by any wave EDIT or COMMAND functions.

- Pressing *Edit* again will return you to the last EDIT page you were on. This lets you select a different Wavesample and then quickly return to the same parameter (SAMPLE START or END, for example) you were editing.

- If you wish to perform editing for an entire layer, simply make sure the cursor is beneath the layer select (LYR=__). You can select the various layers within the instrument by using the *Up/Down Arrow* buttons or the *Data Entry Slider*.

EDIT/Wave Page

These parameters control all the Wavesample pointers such as sample start, sample end, loop points, etc. Also on this page, you can choose the playback mode and set up modulation of the sample start and/or loop position.



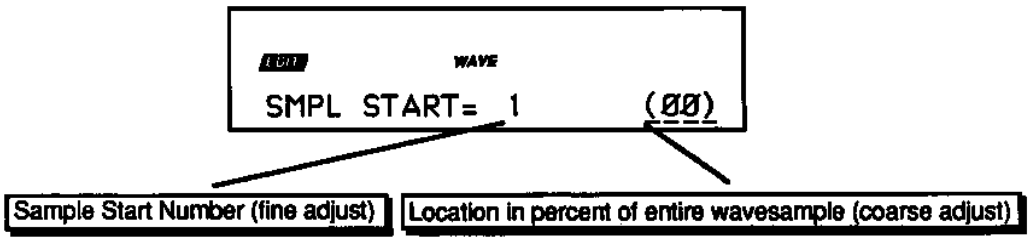
This page allows you to select one of five possible Wavesample playback modes.

- FORWARD—NO LOOP. The EPS-16 PLUS plays through the Wavesample once (also known as "one shot" mode).
- BACKWARD—NO LOOP. The EPS-16 PLUS plays through Wavesample once, only in reverse, from sample end to sample start.
- LOOP FORWARD. The EPS-16 PLUS will play forward from sample start and will continue playing the loop while the key is depressed. Once the key is released the loop continues playing as the Wavesample envelopes away.
- LOOP BIDIRECTION. The EPS-16 PLUS will play forward from sample start. At loop end, the EPS-16 PLUS will play the Wavesample in reverse to the loop start, playing the loop section back and forth until the key is released.
- LOOP AND RELEASE. The EPS-16 PLUS will play forward from sample start and will continue playing the loop while the key is depressed. As soon as the key is released the EPS-16 PLUS will go into "one shot" mode from wherever it is and will keep playing until the end of the Wavesample, playing data after the loop.



This page allows you to set the sample start point. To conserve memory, it's a good idea to move the Sample Start and Sample End to eliminate any "dead space" at beginning or end of the sample, and then truncate the Wavesample using the TRUNCATE WAVESAMPLE command on the COMMAND/Wave page (see discussion later this section).

When the SAMPLE START or SAMPLE END parameters are displayed on the EDIT/Wave page there are two ways to adjust them—you can move in large steps by adjusting the percent setting, or move one sample at a time by choosing the fine adjust



The Coarse Adjust reading is the one in parentheses. Changing this value will move the Sample Start in steps of one percent of the entire Wavesample. Use the *Data Entry Slider* or the *Up/Down Arrow* buttons to move the Sample Start ahead until the dead space is gone when you play.

Once you have gotten close using the percent setting, press the *Left Arrow* button to underline the Fine Adjust setting. Now the *Data Entry Slider* or the *Up/Down Arrow* buttons will move the SAMPLE START in small steps, letting you fine-tune its exact position while playing the sample.

EDIT WAVE	**SAMPLE END**
	Press Edit / Wave / 2

This page allows you to set the sample end point Again you see the sample number (Fine Adjust) and the percent (Coarse Adjust). Use the data entry controls to edit this parameter in the same fashion as the SAMPLE START parameter.

EDIT WAVE	**LOOP START**
	Press Edit / Wave / 3

This page allows you to set the loop start point After making a sample it is often necessary to "loop" — play over and over—a portion of the sound, so that it can sustain indefinitely when the key is held down. Getting a good loop tends to be the most difficult part of sampling. See COMMAND/Wave page later in this section and "Looping" in *Section 5* for more on looping.

Here are a few steps to get you started once you have sampled a sound that you want to loop:

- Turn ON the AUTO-LOOP FINDING parameter on the EDIT/System•MIDI page.
- Press *Edit,* then *System•MIDI,* then scroll left to the parameter AUTO-LOOP FINDING. Make sure it is ON. When AUTO-LOOP FINDING=ON, every time you move the LOOP START or LOOP END points of a Wavesample, the EPS-16 PLUS picks only "optimized" loop points - ones most likely to work.
- On the EDIT/Wave page, the MODE parameter determines whether the Wavesample will loop (among other things). Set it to MODE=LOOP FORWARD.

- Select the LOOP START parameter.
  Move the cursor to underline the Loop Start Percent Reading (the number in parentheses). While holding down a note, move it away from the beginning of the Wavesample (the 25% to 50% range is usually a good starting point).

LOOP START is used in conjunction with the next parameter on the EDIT/Wave page.



This page allows you to set or change the loop end point.

Move the cursor to underline the Loop End Percent Reading (in parentheses) and move it towards the beginning of the Wavesample, using the data entry controls to adjust in the same fashion as the LOOP START parameter. Move the LOOP START and the LOOP END around until you find the best sounding loop.



This displays the LOOP START but moves both LOOP START and LOOP END, keeping the size of the loop the same. It lets you search for the perfect loop after you have created the loop length.



This page allows you to modulate certain parameters of the wave and select the mod source. The first parameter on the page is WAVE MOD TYPE. This specifies which of the wave parameters the modulation will be affecting. There are seven possible MOD TYPES:

- LOOP POS — Selecting this setting will modulate the loop position of the wave, moving it forward (towards the end of the wave) with positive values and backward (toward the beginning of the wave) with negative values.
- START —The SMPL START will be modulated.
- START+LP — Both the SMPL START *and* the Loop Position will be modulated.
- LOOPSTRT — Modulates the Loop Start parameter. This will have the effect of either making the loop shorter (by using positive modulation values to move the Loop Start point closer to the Loop End) or longer (negative values moving the Loop Start away from the Loop End).
- LOOP END — Works the same as LOOPSTRT, but from the back end
- LPSTRT-X — This setting works the same as LOOPSTRT, but a pitch correction scheme is now employed to keep the pitch constant as the loop gets longer and shorter.

- TRANSWAV — Similar to LOOP POS, but the loop will move in increments of exactly one loop length. For example, with LOOPSTART at 0 and LOOPEND at 100, positive modulation will cause the loop to jump to LOOPSTART 100, LOOPEND 200, and then LOOPSTART 200, LOOPEND 300, etc. When this setting is selected, the MOD RANGE parameter (see below) has no effect, but the MOD AMOUNT (also below) sets the number of "jumps" that will happen over the full range of the controller (MOD SRC).

The following can be used as the MOD SRC (Modulation Source) for the wave modulation:

- LFO — Low Frequency Oscillator
- RANDM — Random Modulation
- ENV1—Envelope1
- ENV2 —Envelope2
- PR + VL — Pressure + Velocity
- VEL—Velocity
- VEL1 —Velocity Variation 1
- VEL2 —Velocity Variation 2

KBD — Keyboard Tracking
PITCH — Pitch Bend Wheel
WHEEL — Modulation Wheel
PEDAL — Voltage Control Foot Pedal
XCTRL — External Controller (MIDI)
PRESS — Pressure (After-touch)
WL + PR — Wheel + Pressure

These modulators are described in detail in *Section 7— Voice Parameters.*



Use this page to set the amount of wave modulation selected with the previous parameter. This parameter has two components:

- MOD AMT — This determines the amount of modulation that will be added to the wave parameter specified in the WAVE MOD TYPE parameter. This parameter has a value range of -99 to +99, allowing both positive and negative modulation amounts.

- RANGE — This portion of the parameter determines range that will be covered by the MOD AMT. This range is displayed in sample size. The reason for this is due to the nature of sampled instruments. Where on a synthesizer you would have waves or oscillators that had a defined length that was always the same, with samplers the wave size is always different from instrument to instrument, due to the sample time and rate at which each was sampled. The MOD AMT has no way of knowing this sample size, so the EPS-16 PLUS uses the RANGE to tell it

To determine what size to set the RANGE parameter, go to the SAMPLE END parameter and look at the Sample End number. This number tells you how large the selected sample is in size. You can then select the RANGE value that comes closest to the actual size of the sample.

If you were working with a very small sample you would adjust the wave modulation amount to something like this MOD AMT=+99 RANGE 128. If you were working with a much larger sampler you would adjust the wave modulation to MOD AMT=+99 RANGE=1 MG. Think of RANGE as a multiplier, and MOD AMT=-99 TO +99 as fine tuning.

Wavesample Commands

There are many commands for working with Wavesamples and wavedata. Rather than putting them all on one page, they are broken down into three pages.

The COMMAND/Wave page contains the standard copy and delete commands for Wavesamples, plus several looping commands.

The COMMAND/Amp and COMMAND/LFO pages contain amplitude and wavedata processing commands respectively. Some of these are fairly low-level operations that are rarely used. They are included for completeness.

Selecting Wavesamples For Editing

Before you can do any of the following commands, you must first go to the EDIT page and select the specific layer and Wavesample you want to work on.

- Press the *Edit* button.
- The display reads (for example) INST NAME LYR=1 WS=L
- Use the *Arrow* buttons to select the layer and Wavesample you want to change.
- Press *Command,* then *Wave, Amp, or LFO.*

Now you are ready to execute any of the following commands.

Important: Always make sure the Wavesample you want to edit is selected on the EDIT page.

Messages:

- NO EDIT WS SELECTED — go to the EDIT page and select a Wavesample you want to work on.

- WAVESAMPLE IS A COPY — means the Wavesample you are editing is not an original, but a copy. If you press *Enter•Yes* in response to this message, the EPS-16 PLUS will take the data from the original Wavesample and copy it into the Wavesample you are editing. This will make the Wavesample you are editing larger. If this is undesirable, use the WAVESAMPLE INFORMATION command to find which Wavesample is the original. Then perform the command on the original. See discussion later in this section for more on COPY WAVESAMPLE.

- LAYER NOT IN PATCH — press *Edit,* then *Instrument* and select the correct layer. Use the *Arrow* buttons and enable the layer in the patch, as described earlier in *Section 3 —Instruments and Banks.*

Note: Wherever you see the notation ##, that symbol will represent the numeric value of a parameter whose setting or level is considered arbitrary to the subsequent discussion. For example, if SCALE DEPTH= ## DB, the ## represents the entire range of this parameter. You can use the *Data Entry Slider* or *Up/Down Arrow* buttons to explore these ranges.

COMMAND/Wave Page



A primary function of the EPS-16 PLUS is to create new Wavesamples by sampling external sound sources. However, the EPS-16 PLUS also can create a Wavesample without sampling. The CREATE NEW WAVESAMPLE command creates a small squarewave without sampling.



Use this command to make a copy of the currently selected Wavesample and its data, or a copy of its parameters only. See UNDERSTANDING COPY COMMANDS in *Section 7 — Voice Parameters*.

COPY WAVESAMPLE lets you use the same section of data to change envelopes, tuning, and other parameters. You can copy the parameters and data of the original Wavesample, or just the parameters. Selecting PARAMS ONLY helps conserve memory. For example, you can create huge stereo mixes by placing original Wavesamples on the left channel, and copies on the right and then detuning the copies.

- Select COPY WAVESAMPLE. Press *Enter•Yes.*
- The display reads TO INST=UNNAMED. Press an *Instrument•Track* button to choose the destination instrument (if necessary). Press *Enter•Yes.*
- The display reads TO LAYER=##. Using the *Up/Down Arrow* buttons, select a destination layer. Press *Enter•Yes.*
- Use the *Up/Down Arrow* buttons to select COPY=PARAMS ONLY or COPY=PARAMS & DATA. Press *Enter•Yes.* The display reads WAVESAMPLE ## CREATED.



Use DELETE WAVESAMPLE to erase unneeded Wavesamples from an instrument in memory. For example, deleting Wavesamples of drum sounds that you don't need from a drum kit Doing this can help you conserve memory.

- Be sure the Wavesample you want to delete is selected on the EDIT page.
- Select DELETE WAVESAMPLE. Press *Enter•Yes.*
- The display will read DELETE WAVESAMPLE ##? If this is the Wavesample you want to delete, press *Enter•Yes.* If not, press *Cancel•No.*

CMD WAVE

WAVESAMPLE INFORMATION

Press Command / Wave / 3

You can use WAVESAMPLE INFORMATION to name a Wavesample; find out the sample rate; whether or not a Wavesample is a copy; and what the root key is, The WAVESAMPLE INFORMATION command is used primarily for reference, and is useful for keeping track of things when you are developing sounds.

- Select WAVESAMPLE INFORMATION. Press *Enter•Yes.*
- The display reads WS NAME=#####. Use the data entry controls to name the Wavesample as you would any other file. Press *Enter•Yes.*
- The display reads SAMPLE RATE=##KHZ. You can now use the *Up/Down Arrow* buttons to change the sample rate at which the sample will play. Notice that changing the sample rate effectively changes the playback pitch as well. Press *Enter•Yes.*
- The display reads ROOT KEY=##. The *Up/Down Arrow* buttons will now change the root key. Press *Enter•Yes.*
- If the Wavesample is a copy, the display will read COPY OF LYR ## WS ##. This parameter is display only, and cannot be changed.

If you get the message, LAYER NOT IN PATCH, press *Edit,* then *Instrument.* Use the *Arrow* buttons to enable the layer in the patch.

CMD WAVE

TRUNCATE WAVESAMPLE

Press Command / Wave / 4

Truncating can remove data before the sample start, and/or after the sample end. The memory formerly used by the truncated data is then returned to the available memory. *The EPS-16 PLUS will not truncate the Wavesample if there are copies that use the same data.* You must move the sample start and end of all the copies.

- Select TRUNCATE WAVESAMPLE. Press *Enter•Yes.*

Note: In the following loop commands, the messages INCREMENT LOOPSTART, or DECREMENT LOOPEND may appear. When they do, the EPS-16 PLUS is letting you know there's a problem with the loop length. Try changing the FADE ZONE. You could also press *Edit,* then *Wave,* and adjust the loop points. To move the loop points one sample at a time, make sure AUTO-LOOP FINDING (on the EDIT/System•MIDI page) is OFF.

CMD WAVE

CROSS FADE LOOP

Press Command / Wave / 5

The idea behind crossfading is to blend the data preceding the start of the loop with the data at the end of a loop, for a smooth transition between the two. The CROSSFADE LOOP command is a simple cross fade that works well with periodic waveforms that are relatively constant in tone. The default values are: scale depth=3 dB; fade zone=50%.

Scale depth determines the amount of volume drop that will have occurred in the original material at the half-way point of the cross fade. The material that is being added will follow an inverse curve, moving up to the same level at the half way point. The end result should be an even level of volume as the cross fade occurs.

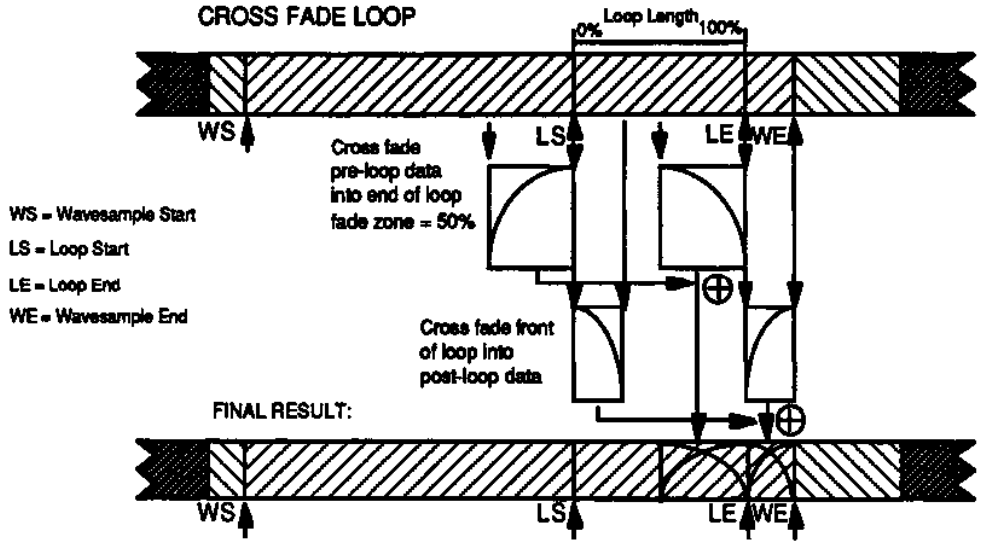
The fade zone determines the percentage of the loop over which the cross fade will occur. A setting of 99% would cause the cross fade to begin at the beginning of the loop. Lower values will start the fade nearer the *end* of the loop, causing the fade to occur in a shorter period of time.

Manual settings are: scale depth=3.0 dB to 6 dB, fade zone=l% to 99%. With manual settings, 3 dB will give you an exponential curve, while 6 dB is linear.

- Select CROSSFADE LOOP. Press *Enter•Yes.*
- The display reads USE DEFAULT VALUES? Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Underline NEW and play the note to hear the new loop, or underline OLD to hear the original. Underline NEW and press *Enter•Yes* to keep the new loop. Or, press *Cancel•No* to keep the old loop (the old loop will be kept no matter the location of the cursor).

Whenever the KEEP=OLD NEW message appears, the EPS-16 PLUS is giving you the chance to "audition" the results of the operation, before you commit any changes to memory.

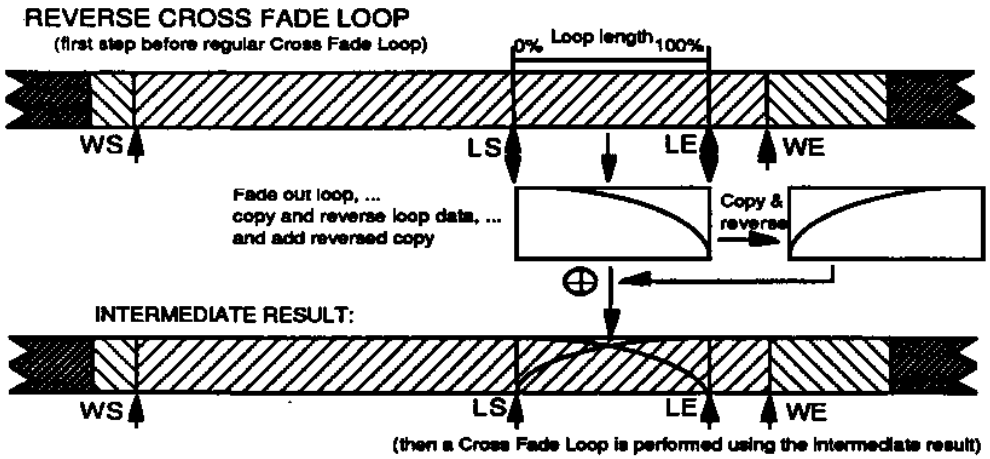
- Pressing *Cancel•No* in response to USE DEFAULT VALUES, prompts the EPS-16 PLUS to display the manual values for this command: SCALE DEPTH=(3.0, 3.5, 4.0, 4.5, 5.5, or 6.0 DB). FADE ZONE (PERCENT)=(1 to 99). Use the *Up/Down Arrow* buttons, or the *Data Entry Slider* to change the scale depth or fade zone. Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).



CMD WAVE	**REVERSE CROSS FADE**
	Press Command / Wave / 6

The reverse cross fade loop helps eliminate tonal bumps, and smooths out the tonal content of the loop. The reverse cross fade works well with multiple source sounds such as string sections, brass ensembles, and choirs. The default and manual values are the same as in the cross fade.

- Select REVERSE CROSSFADE. Press *Enter•Yes.*
- The screen will ask, USE DEFAULT VALUES? Press *Enter•Yes.*
- Pressing *Cancel•No* in response to USE DEFAULT VALUES? displays the manual values: SCALE DEPTH=## DB. Scroll to FADE ZONE (PERCENT)=##. Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).



CMD WAVE **ENSEMBLE CROSS FADE**

Press Command / Wave / 7

The ensemble is essentially a cross fade loop with the fade zone set to 100%. If you use the default values, the EPS-16 PLUS may tell you DEFAULTS CANNOT BE SET. Then it will advise, INCREMENT LOOP START or, DECREMENT LOOP END (EDIT/Wave page). This is because the data preceding the loop is shorter than the loop itself. For the ensemble cross fade to work, the fade zone must be 100% of the loop length. You can either make sample start smaller so that you add more data preceding the loop, or move the loop around using loop position on the EDIT/Wave page. The only manual setting here is SCALE DEPTH which is the same as the cross fade. The fade zone is not a parameter, because it is always assumed to be 100% of the loop length.

- Select ENSEMBLE CROSS FADE. Press *Enter•Yes.*
- The display reads USE DEFAULT VALUES? Press *Enter•Yes.*
- Pressing *Cancel•No* in response to USE DEFAULT VALUES? displays the manual value: SCALE DEPTH=## DB. Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).

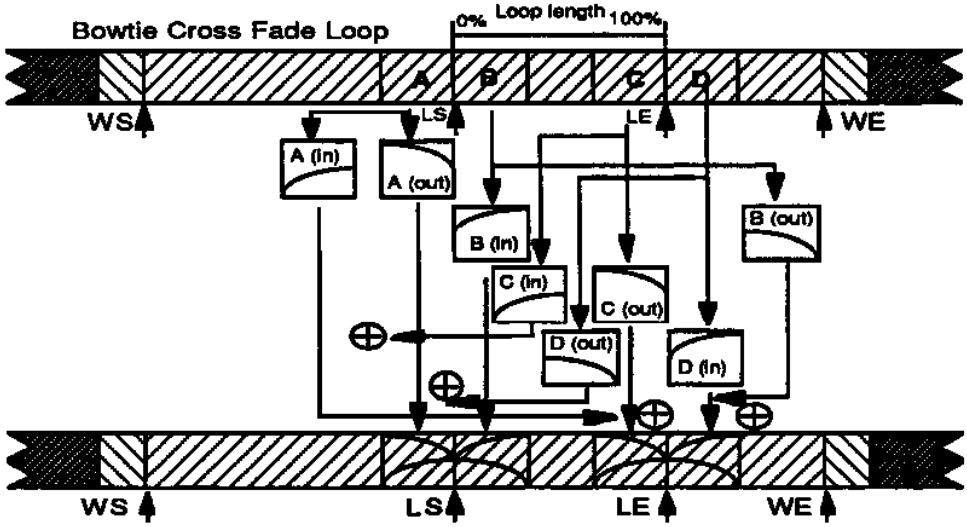
CMD WAVE **BOWTIE CROSS FADE LOOP**

Press Command / Wave / 8

This parameter is used to equalize the data around the loop points so the transition in to and out of the loop splice point is very smooth. The bowtie cross fade works well on sounds with a lot of ambience, reverb, or other effects. The bowtie cross fade zone can never be greater than 50%, otherwise you will overlap data halfway through the loop. The bowtie cross fade is limited by the length of the post-loop data (the data from loop end to Wavesample end).

If you truncate a sound with Wavesample end equal to loop end, you can not use the bowtie loop, because it needs some data after loop end to make the loop. There would not be enough post-loop data to follow the command. If this happens, the EPS-16 PLUS will advise, DECREMENT LOOPEND. For the bowtie you need to have the loop away from the ends of the Wavesample. You can decrement loop position in the same way you had incremented it for the ensemble cross fade. The default values are the same as the cross fade. The manual settings are: fade zone, 1% to 50%; scale depth, 3 dB to 6 dB.

- Select BOWTIE CROSS FADE LOOP. Press *Enter•Yes.*
- The display reads USE DEFAULT VALUES? Press *Enter•Yes.*
- Pressing *Cancel•No* to USE DEFAULT VALUES? displays the manual values: SCALE DEPTH=## DB, FADE ZONE (PERCENT)=##. Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).

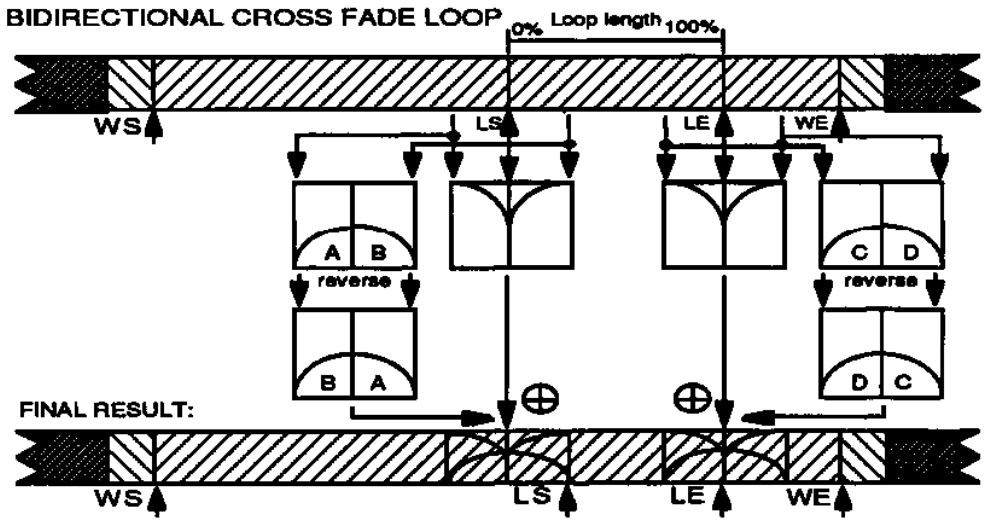


CMD WAVE	**BIDIRECTIONAL X-FADE**
	Press Command / Wave / 9

This cross fade is optimized for use with bidirectional loops. One advantage of the bidirectional loop (which you can select on the EDIT/Wave page) is that it makes a loop that sounds twice as long as the amount of data being used. It does this by playing the loop forward and backward. As a result, the bidirectional loop is very memory conservative and is best suited for ensemble sounds that have a slowly modulated sustain, such as the bowing in a string section.

The default and manual values are the same as the cross fade. It is very important to remember that the loop points should be adjusted with autolooping off. Unlike other looping algorithms which look for a "zero crossing," the bidirectional works best when the loop points are set to the peaks in the waveform.

- Select BIDIRECTIONAL X-FADE. Press *Enter-Yes.*
- The display reads USE DEFAULT VALUES? Press *Enter•Yes.*
- Pressing *Cancel•No* in response to USE DEFAULT VALUES? displays the manual values: SCALE DEPTH=## DB, FADE ZONE (PERCENT)=##. Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).



Note: When using the MAKE LOOP LONGER, SYNTHESIZE LOOP, or CONVERT SAMPLE RATE commands, you should select only the layer that contains the Wavesample you want to work on. If there are copies of the Wavesample you are editing elsewhere in the instrument, the EPS-16 PLUS will display the COPIES WILL CHANGE-OK? message.

For instance, if you try to execute the convert sample rate command and the COPIES WELL CHANGE-OK? message appears, it is possible the conversion may produce apparent pitch problems. This is because the pitch parameters haven't been converted yet. However, they will be converted once you decide to choose KEEP=NEW. With the MAKE LOOP LONGER and SYNTHESIZE LOOP commands, the loops may sound odd until you choose KEEP=NEW.

CMD WAVE	**MAKE LOOP LONGER**
	Press Command / Wave / scroll using the arrow buttons

If you are having a hard time getting a satisfactory loop—after you've tried the other looping commands—try making the loop longer. This process physically enlarges the loop, making the periodicity of the loop less noticeable. However, there is a trade-off: longer loops use more memory. The default and manual values are the same as the cross fade. *This is not recommended for bidirectional loops.*

- Select MAKE LOOP LONGER. Press *Enter•Yes.*
- The display reads USE DEFAULT VALUES? Press *Enter•Yes.*
- Pressing *Cancel•No* displays the manual values: SCALE DEPTH=## DB, FADE ZONE (PERCENT)=##. Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).



This is the algorithm to use when all other looping techniques have failed to make a smooth loop. Unlike the other looping algorithms, the "synth loop" uses a certain amount of random data processing. It's a "loop anything" algorithm, which works well with special effects. With the "smoothness" parameter, the smoother the loop, the more processes the EPS-16 PLUS goes through to create the synth loop. For example, if you do synth loop on a voice sample, and the "smoothness" is set to very coarse, it may create a loop that sounds irregular or nervous. At the other extreme, if the setting is too fine, it may sound metallic. The default values are the same as the cross fade. Manual settings: fade zone=l% to 99%. Smoothness=Very Fine to Very Coarse.

- Select SYNTHESIZED LOOP. Press *Enter•Yes.*
- The display reads USE DEFAULT VALUES? Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes.*
- Pressing *Cancel•No* to USE DEFAULT VALUES? prompts the EPS-16 PLUS to display the manual values: FADE ZONE (PERCENT)=##. Scroll to and select, SMOOTHNESS=VERY FINE, FINE, MEDIUM, COARSE, VERY COARSE. Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).



This command effectively resamples a sound at a different sampling rate. You can start sampling with a high rate, then if you need more memory later, you can convert to a lower sample rate. The EPS-16 PLUS lets you compare these conversions before committing them to memory. When you convert from a higher to a lower sample rate, it's like transposing the sound up the keyboard: you play fewer samples and the sound is shorter. Conversely, a lower to a higher sample rate has the effect of transposing down the keyboard: the sound gets bigger, and stretches out. Sample Rate 48.0 KHZ down to 6.25 KHZ.

- Select CONVERT SAMPLE RATE. Press *Enter•Yes.*
- The display reads SAMPLE RATE=## KHZ. Use the *Data Entry Slider* or *Up/Down Arrow* buttons to select a new sample rate. Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).

CMD WAVE	**RESAMPLE WITH EFFECT**
	Press Command / Wave / scroll using the arrow buttons

This command allows you to digitally record a Wavesample with effects from one channel of the output of the EPS-16 PLUS. This is useful when special effects are used for only one or a few samples. It is also very useful when creating drum kits, allowing each individual drum to have its own signal processing. It then frees up the signal processor to be used for more general purpose effects. This is especially useful during sequencing. To resample a Wavesample with an effect:

- Adjust the effect parameters until you're satisfied with the sound.
- Select the Wavesample for editing.
- Select RESAMPLE WITH EFFECT.
- Press *Enter•Yes*. The display reads: TO INST# LYR# WS##. Use the data entry controls to select where the resulting (resampled) Wavesample should be placed. The resampled wave must be placed within the same instrument (you can copy it later). If you'd like it to reside in a new Wavesample, rather than replacing one already in the instrument, you must first create a new Wavesample using the CREATE NEW WAVESAMPLE command.
- Press *Enter•Yes* or the *Right Arrow* button. The display reads KEY TO RESAMPLE=###. From the MIDI keyboard connected to the EPS-16 PLUS, play the which contains the wave you want to be resampled. The note you select here corresponds to what the new sample will sound like, and that note will become the new root key of the resulting Wavesample (unless the layer it is in has NO PITCH selected as the pitchtable, in which case the resulting wave will automatically be given a root key of C4).
- Press *Enter•Yes* or the *Right Arrow* button. The display now shows the recording time parameter. Use this to set the amount of time the system will record when resampling. When you calculate the time (shown in seconds and hundredths of a second), remember to take into account not only the length of the sample, but the time needed for any effects (such as reverb) to die away.
- Press *Enter•Yes* or the *Right Arrow* button again. You can now select from which output you'll resample. On some effects, such as reverb, this may not make much of a difference, but for some others like the DUAL DELAYS, which side you select will affect the sound of the resampled wave. Also, check the panning on the Wavesample to make sure it is not panned too far to one side.
- With these parameters set, press the *Enter•Yes* button. The display will flash DATA BEING PROCESSED and you will hear the sample play with the effect You do not have to play a note for resampling to occur, nor do you have to select a root key. Once completed, the KEEP=OLD/NEW page comes up.
- Press *Enter•Yes* to keep the resampled wave, or *Cancel•No* to try again.

Hint: There is a trick you can perform with the RESAMPLE WITH EFFECT command to create "instant pre-verb." Select a Wavesample and set the MODE to BACKWARDS NO LOOP on the EDIT/Wave page. Add reverb to the wave and resample, as described above. Next, take the resampled wave and reverse its direction, again using the MODE=BACKWARDS NO LOOP parameter on the EDIT/Wave page. This turns the sample back around so that it plays in the original direction, but with the reverb fading in *before* the sound. This is great on snare drums, or adds a spooky "otherworldly" effect to voices.

CMD WAVE	**COPY WAVE PARAMETERS**
	Press Command / Wave / scroll using the arrow buttons

This command will copy all the parameters (but not the data) from a source Wavesample to a destination Wavesample. All the parameters (envelopes, filters, amp, pitch, mod parameters, etc.) are copied from the source Wavesample to the destination Wavesample, except for the actual sample points (sample start/end, loop start/end) and root key.

- Select COPY WAVE PARAMETERS. Press *Enter•Yes*.
- The display reads TO INST=## LYR=## WS=##. Select the destination instrument, layer, and Wavesample. The current (or EDIT) Wavesample is used as the source.
- Press *Enter•Yes.* The display reads COMMAND COMPLETED.

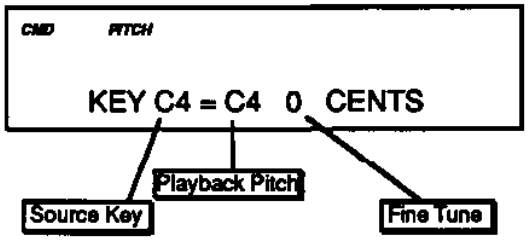
COMMAND/Pitch Page

These commands allow you to create, delete and manipulate pitch tables.



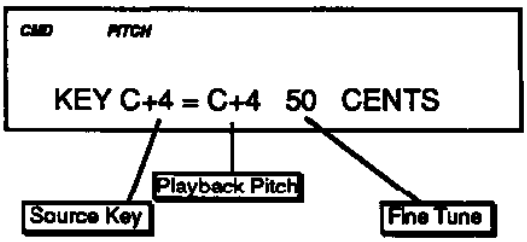
Use this command to create or edit pitch tables.

- Load your operating system and sample a sound. Pick C4 as the root key.
- Select EDIT PITCH TABLE.
- Press *Enter•Yes.* The display reads CREATE NEW PITCH TBL?
- Press *Enter•Yes.* The display reads KEY E4 = • 0 CENTS. This is the default display. If you press any key on the keyboard the display will change.
- Press Middle C on the keyboard. The display now looks like this:



The source key can be thought of as the physical location of the key on a keyboard. The playback pitch can be the same as the source key—as shown in the display—or it can be any pitch from A0 to C8. The range of the fine tune is 0 to 99 cents; This enables you to create micro-tunings. To do this—

- Play C4+ (the source key). Or, use the *Up/Down Arrow* buttons or the *Data Entry Slider* to select the source key.
- Underline 0 in the display (fine tune), and change that to 50 CENTS. The display now looks this:



You have just defined a new interval between C and C4+. That interval has now been stretched by 50 cents. You can now repeat this process for each key on the keyboard to create your own custom pitch table.

You can't copy, delete, or extrapolate the STANDARD or NO PITCH pitch tables. If you try, you will get the message NO EDIT PITCH TABLE. You must create a new pitch table first using the EDIT PITCH TABLE command.



This command will copy a pitch table from one instrument to another instrument

- Select COPY PITCH TABLE.
- Press *Enter•Yes.* The display reads TO INST=##. Select the instrument where you would like the pitch table to be placed.
- Press *Enter•Yes.* The display reads PITCH TABLE ## CREATED.



This command will erase (delete) a pitch table. The custom pitch table will be replaced by conventional western tuning.



Use this command to project or extend pitch tables across the keyboard range. In other words, you can take the intervals defined between any two notes or group of notes, and extend that same relationship over the entire keyboard range.

- Select EXTRAPOLATE PITCH TBL.
- Press *Enter•Yes.* The display reads SOURCE LO=## HI=##. This determines the range of the extrapolation.
- From the MIDI controller connected to the EPS-16 PLUS, play the low key of the range you wish to extrapolate.
- Scroll right to underline HI=ft
- Play the high key of the range you wish to extrapolate.
- Press *Enter•Yes.* The display reads COMMAND COMPLETED.

COMMAND/LFO Page

These commands are used for processing wavedata.



Use this when you want silence as part of the Wavesample. Use the "start and end" addresses to select a section of Wavesample data you want to clear.

- Select CLEAR DATA. Press *Enter•Yes.*
- Select START ADDR=## (##). Scroll to END ADDR=## (##).
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).



Copy Data enables you to copy a section of data from one Wavesample into another Wavesample. Use the "start and end" addresses, to copy wavedata from a source to a destination. In fact, source and destination could be the same Wavesample, or the destination Wavesample could be in a different instrument.

- Select COPY DATA. Press *Enter•Yes.*
- Select FR INST=## LYR## WS=##. Scroll to START ADDR=## (##).
- Scroll to END ADDR=## (##). Scroll to TO INST=## LYR=## WS=##.
- Scroll to DEST ADDR=## (##). Press *Enter•Yes* to complete the command.



The Replicate Data command is used when you want to append a section of wavedata to itself until the entire Wavesample is filled. Set the data range with the "start and end" addresses.

- Select REPLICATE DATA. Press *Enter•Yes.*
- Select START ADDR=##(##). Scroll to END ADDR=## (##). Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command.



The Reverse Data command takes the wavedata in the specified range and turns it around backward, so that the last sample becomes the first one, the next-to-last sample becomes the second, and so on. It has the same effect as playing the sound backward.

- Select REVERSE DATA. Press *Enter•Yes.*
- Select START ADDR=##(##). Scroll to END ADDR=## (##).
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).



This command inverts the phase of the selected wavedata. This is the equivalent of playing the Wavesample upside down, with all frequency peaks becoming valleys and vice-versa. If you're performing advanced Wavesample manipulation it is sometimes helpful to invert the phase of a signal for the purposes of crossfading. This will sometimes produce a smoother Crossfade point.

- Select INVERT DATA. Press *Enter•Yes.*
- Select START ADDR=##(##). Scroll to END ADDR=## (##).
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).



This command is similar to COPY DATA, except it adds data, according to the source and destination range. It could be the same Wavesample, or a different one. When PREVENT CLIPPING is enabled, the EPS-16 PLUS (if necessary) will scale down the destination and source data, so the added data doesn't result in clipping.

- Select ADD DATA. Press *Enter•Yes.*
- Select FR INST=## LYR=## WS=##. Scroll to START ADDR=## (##).
- Scroll to END ADDR=## (##). Scroll to TO INST=## LYR=## WS=##.
- Scroll to DESTADDR=##(##). Scroll to PREVENT CLIPPING=(NO/YES). Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes,* or *Cancel•No* to abort the procedure.



This is a "sound sculpting" tool that will enable you to shape the volume contour of the waveform. As in the other commands, you select some range of data using the start and end addresses. You also set the scaling range with scale start and scale end points. These are multipliers. Scale start is a multiplier used at the beginning of the source range. Scale end is the multiplier used at the end of the source range. If the two scale points are the same, it's like multiplying the whole range of data by the same number. So, if you wanted to drop the level in half, you would set scale start and end to 0.5. Scale depth works as described previously. If the scale points are different, the data will be scaled using a scaling curve whose depth is controlled by the scale depth.

- Select SCALE DATA. Press *Enter•Yes.*
- Select START ADDR=##(##). Scroll to END ADDR=## (##). Scroll to SCALE START=##.
- Scroll to SCALE END=##. Scroll to SCALE DEPTH=## DB. Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

COMMAND/Amp Page



This command maximizes the dynamic range of a Wavesample. Normalize gain always works on the currently selected Wavesample (selected on the EDIT page) and has no parameters. It will make the sound louder, unless it is already at full level. Normalize gain finds the largest sample value, and uses that to scale the whole range of the sample to its absolute full level



Volume smoothing works like a dynamic compressor. The idea is to remove amplitude changes. The degree to which it does this is determined by "smoothness." It works on a given range of sound, determined by the start and end address parameters. This command is very useful for smoothing out a loop, and getting rid of clicks caused by volume bumps.

For instance, if you are working with a piano loop, there is a natural envelope that is always decaying. If you try to loop on the section that is decaying, the loop end data will be at a much lower amplitude than the beginning. You would end up with a click, because of an abrupt change in amplitude. Volume Smoothing will help make the level constant. When the EPS-16 PLUS displays DATA RANGE TOO SMALL, it is advising you that the minimum range to do this command is 256 Samples.

This command is most useful for loops, but you can use it on the whole sample. If you wanted to remove a natural envelope from a piano, for example, you can use volume smoothing over the whole length of the sample. You can then superimpose any amplitude envelope from the EPS-16 PLUS over that sample. SCALEDEPTH=3.0 to 6.0dB. SMOOTHNESS=VERY FINE to VERY COARSE.

- Select VOLUME SMOOTHING. Press *Enter•Yes.*
- The display reads USE LOOP FOR RANGE? Press *Enter•Yes* to automatically set the start and end addresses to the loop points.
- Select START ADDR=## (##). Use the *Left/Right Arrow* buttons to scroll through the various screens. Use the *Up/Down Arrow* buttons to change the values in the display.
- Scroll to and select END ADDR=## (##). Scroll to and select the SCALE DEPTH=##DB. Scroll to and select the SMOOTHNESS=####. Press *Enter•Yes.*
- Select KEEP=OLD NEW. Press *Enter•Yes* to complete the command.
- Pressing *Cancel•No* for USE LOOP FOR RANGE? lets you adjust the start and end addresses manually.

- Select START ADDR=## (##). Scroll to and select the END ADDR= ## (##).
- Scroll to and select the SCALE DEPTH=## DB. Scroll to and select the SMOOTHNESS=####. Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).

Mix, Merge, and Splice

The mix, merge, and splice commands are very similar. You will always be working on a pair of Wavesamples—source and destination Wavesamples. These commands take a source WS and mixes, merges, or splices it into a destination WS. FR INST=##LYR=##WS=##, determines the source. TO INST=## LYR=## WS=## determines the destination. For best results the source and destination Wavesample should be in the same instrument, in different layers.

CONVERT SOURCE PITCH and CONVERT DEST PITCH let you combine Wavesamples that were sampled at different sample rates, or were on different root keys. If the Wavesamples are on the same root key, but have different sampling rates, their data will be different. The EPS-16 PLUS can't simply add them together because they would be out of tune with each other. It has to convert the sample rate of one or the other.

Before executing these commands, you should assign the destination (or resulting) layer to one of the patch selects (on the EDIT/Instrument page). That way, when you "audition" the sound after the commands have been executed, you can specifically hear the final results of the operation, and not the final results and the source Wavesample together. This process is similar to that described in the COPY WAVES AMPLE command.

Note: When using the merge or splice commands, the volume balance function only lets you hear the relative volumes of the source and destination Wavesamples, not the final results. You will be able to hear the final results after the Wavesamples have been merged or spliced. Volume balance controls the relative volumes of the source and destination Wavesamples. When the value is negative, the source Wavesample is louder. And when the value is positive, the destination is louder.



Mixing Wavesamples is a lot like layering two Wavesamples. It adds the data of the two Wavesamples together. For example, to make a "bowed voice," you would assign the "bow" Wavesample to one layer, then the "voice" Wavesample to a different layer, and use "mix" to combine them digitally into one Wavesample.

- Select MIX WAVESAMPLES. Press *Enter•Yes.*
- The display reads ARE SAMPLES LAYERED? Press *Enter•Yes.*
- Select FRINST=##LYR=##WS=##.

- Scroll to TO INST=## LYR=## WS=##.
- Scroll to CONVERT SOURCE PITCH, or CONVERT DEST. PITCH. Press *Enter•Yes.*
- Scroll to VOLUME BALANCE=(-99 TO +99). Use the *Data Entry Slider* to set the balance between the two.
- Press *Enter•Yes.* The display then reads KEEP=OLD NEW. Press *Enter•Yes* to keep the mixed Wavesamples, or *Cancel•No* to keep the originals intact.



Merge Wavesamples takes source wavedata, and cross fades it into destination wavedata. Merge Wavesamples has many of the same parameters as "mix," with the addition of scale depth and fade zone. The scale depth and fade zone operate the same as with the cross fade.

- Select MERGE WAVESAMPLES. Press *Enter•Yes.*
- The display reads ARE SAMPLES LAYERED? Press *Enter•Yes.*
- Select FRINST=##LYR=##WS=##. Scroll to TO INST=## LYR=## WS=##.
- Scroll to SCALE DEPTH=## DB. Scroll to FADE ZONE (PERCENT)=##.
- Scroll to CONVERT SOURCE PITCH or CONVERT DEST. PITCH.
- Scroll to VOLUME BALANCE=##. Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).



This command takes the end of a source sample, and splices it to the beginning or start of the destination sample. SPLICE WAVESAMPLES is just like a tape splice—a butt splice. You can also think of it as "Merge" with a zero length fade zone.

- Select SPLICE WAVESAMPLES. Press *Enter•Yes.*
- The display will ask ARE SAMPLES LAYERED? Press *Enter•Yes.*
- Select FR INST=## LYR=## WS=##. Scroll to TO INST=## LYR=## WS=##.
- Scroll to CONVERT SOURCE PITCH. Scroll to CONVERT DEST. PITCH.
- Scroll to VOLUME BALANCE=-99 to +99 (see note on the previous page). Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).



This command scales the volume of the wavedata from 0% to 100% to create a digital fade-in of the sound. First, select a data range, using the start and end addresses, then choose an appropriate fade curve. 3 dB fades are very smooth and analogous to the way our hearing responds to sound.

- Select FADE IN. Press *Enter•Yes.*
- Select START ADDR=## (##). Scroll to END ADDR=## (##).
- Scroll to SCALE DEPTH=## DB. Press *Enter•Yes.*
- The display reads KEEP=OLD NEW.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).



This command scales the volume of the wavedata from 100% to 0% to create a digital fade-out of the sound. The parameters are the same as above.

- Select FADE OUT. Press *Enter•Yes.*
- Select START ADDR=## (##). Scroll to END ADDR=## (##).
- Scroll to SCALE DEPTH=## (##). Press *Enter•Yes.*
- The display reads KEEP=OLD NEW.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).

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Section 7 — Voice Parameters

This section covers those functions which can be edited independently for each individual voice within the program.

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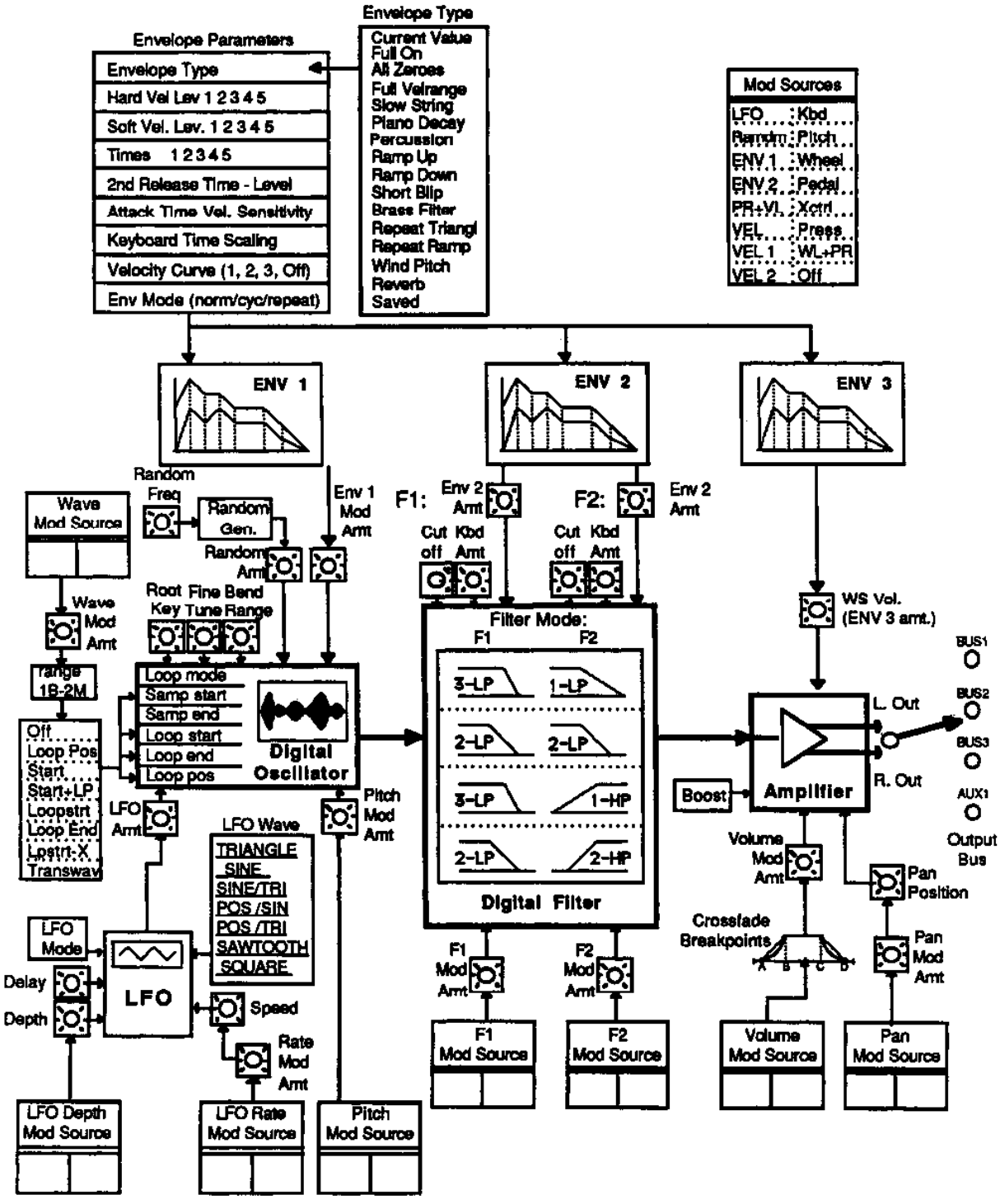
EPS-16 PLUS Voice Configuration

Each EPS-16 PLUS Instrument consists of up to eight *Layers*, and up to 127 *Wavesamples*. Each of the Wavesamples within an EPS-16 PLUS instrument consists of:

- a digital oscillator playing a wave from memory
- two multi-mode digital filters
- one LFO (Low Frequency Oscillator)
- three complex envelope generators for controlling volume, pitch, filter frequency, etc.
- a versatile matrix modulation scheme with 15 routable modulation sources

The diagram on the following page shows the configuration of one EPS-16 PLUS voice.

EPS-16 PLUS Voice Configuration



Modulators

About Modulation

To modulate something is simply to cause it to change. Within the voice architecture of the EPS-16 PLUS we begin by setting basic, or manual, levels for the volume, pitch, brightness, etc. of a voice, and we then modulate those levels in various ways in order to create movement and dynamics.

Suppose you switch on your stereo, and turn the volume half way up. We can call this the manual volume setting. It will stay at that level until it's changed Now suppose that you take the volume knob of your stereo and begin quickly turning it up and down, so the volume gets continuously louder and softer, louder and softer. What you would be doing is modulating the volume of your stereo. If you were to take the treble control, and do the same to that knob, you would be modulating the brightness of your stereo.

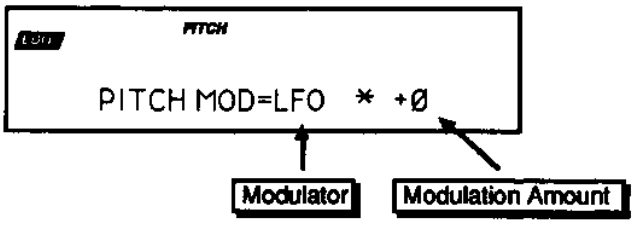
In much the same way we modulate various levels within the EPS-16 PLUS (though generally the approach is less haphazard). There are 15 different *Modulation Sources* available, and they can each be independently assigned to vary the manual levels for a great many aspects of a voice, including real time control of some aspects of an effects program.

Selecting a Modulator

On those programming pages where a modulator can be selected to vary the level of some function within an EPS-16 PLUS voice, the display shows MOD=_____(short for Modulation Source). A modulator is chosen by selecting (underlining) that parameter with the *Left/Right Arrow* buttons, and then using the *Data Entry Slider* or the *Up/Down Arrow* buttons to select among the 15 available modulation sources.

Hint: Moving the *Data Entry Slider all* the way up selects OFF, which is handy if you don't want a modulator applied in a particular location.

Let's take, for example, the Pitch Mod page, which is where you apply modulation to the pitch of a Wavesample. Press *Edit,* then *Pitch.* Next, press the *Right Arrow* button repeatedly until the following page appears:



Modulation Amount

As shown above, where a modulation source is selected, the parameter immediately to its right controls the *Modulation Amount* (the display shows • ± ##) which controls how deeply the selected modulator will affect the level to which it is being applied.

Press the *Right Arrow* button to underline the Modulation Amount, and use the data entry controls to adjust it Modulation amount can be positive or negative. A modulation amount of +00 has the same effect as turning the modulator OFF.

Hint: With modulation amount, as with all parameter values that have a center value (in this case, +00), there is an easy way to reach that value. With the Modulation Amount parameter selected, press the *Down Arrow* button, and *while holding it down*, press the *Up Arrow* button, then quickly release both buttons. This automatically sets the modulation amount to +00.

Modulation Sources

The 15 Modulation Sources available on the EPS-16 PLUS are as follows:

- LFO — Low Frequency Oscillator
- RANDM — Random Modulation
- ENV1 — Envelope 1
- ENV2 — Envelope 2
- PR + VL — Pressure + Velocity
- VEL — Velocity
- VEL1 — Velocity Variation 1
- VEL2 — Velocity Variation 2

KBD — Keyboard Tracking
PITCH — Pitch Bend Wheel
WHEEL— Modulation Wheel
PEDAL — Voltage Control Foot Pedal
XCTRL — External Controller (MIDI)
PRESS — Pressure (After-touch)
WL + PR — Mod Wheel + Pressure

- **LFO — Low Frequency Oscillator**
  The *Low Frequency Oscillator* generates only very low frequency waves, below the audio spectrum, which can produce vibrato, tremolo, and many other effects, depending on the LFO wave selected, and where it is applied as a modulator. There are seven possible waveshapes for the LFO. See EDIT/LFO page later in this section for a complete discussion of the LFO.

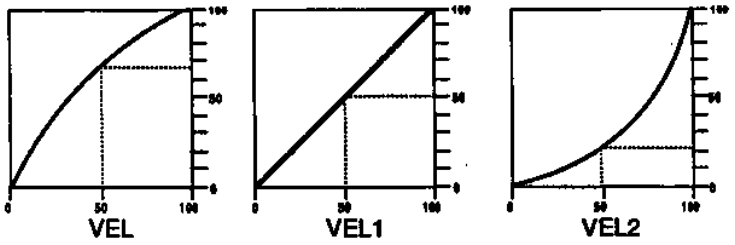
- **RANDM — Random Noise Generator**
  The Random Noise generator creates a randomly changing level. It is useful for modulating, among other things, the pitch of a voice (EDIT/Pitch page). Applied to pitch with large modulation amounts it tends to create strange "computer sound" effects. Small modulation amounts (around +02 to +04) can create a subtle random movement in the sound, which can impart a more natural quality.

- **ENV 1, ENV 2, (ENV 3)**
  The EPS-16 PLUS has three complex *Envelopes*. Envelopes are used to create changes, over time, in pitch, brightness, volume, etc.
  - ENV 1 is permanently routed to the pitch of the voice, though it can be assigned as modulator elsewhere if you wish.
  - ENV 2 is permanently routed to the filter cutoff frequency. It also can be assigned as a modulator elsewhere.
  - ENV 3 is a special case. ENV 3 *always* controls the volume of the voice, and cannot be selected as a modulator anywhere else.

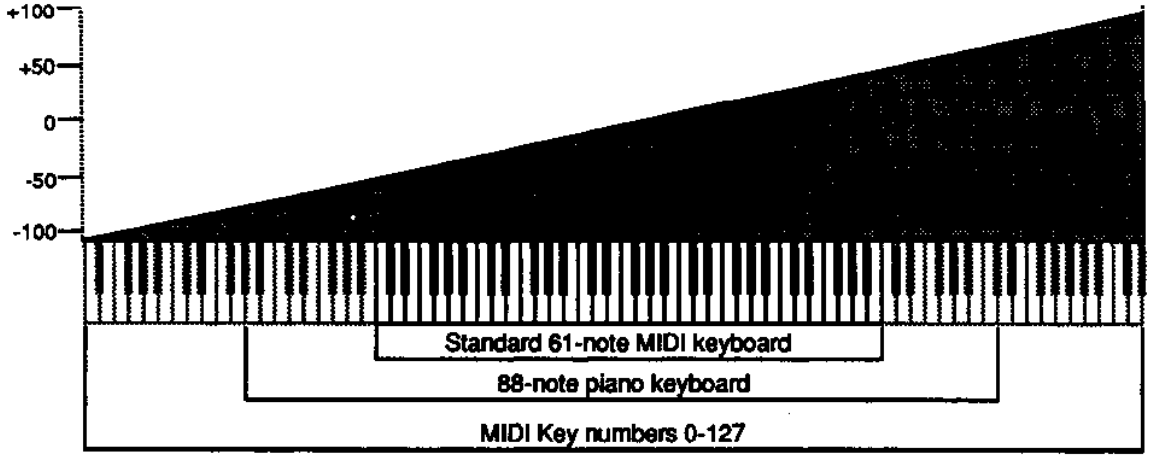
  A discussion of the EPS-16 PLUS Envelopes follows later in this section.

- **PR + VL — Keyboard Pressure + Velocity**
  This is one of two "combination" modulators. When this modulator is selected, either pressure *or* velocity will affect the level which is being modulated.

- **VEL, VEL 1, VEL 2 — Velocity**
  Velocity refers to how hard you strike a key. Selecting VEL, VEL 1, or VEL 2 as a modulator allows you to modulate any manual level with velocity. Velocity as a modulation source only goes positive (though assigning a negative modulation amount will make the net result be to reduce the level with increased velocity). Each velocity modulator has its own response curve, shown below:



- **KBD — Keyboard Tracking**
  This uses the position of a note on a keyboard as a modulator. The scaling effect of this modulator is figured over the full 128 MIDI key numbers:



- **PITCH — Pitch Bend Wheel**
  This complex modulator groups controller information received from a Pitch Bend Wheel, along with any other pitch modulators and pitch tables assigned to the voice, to form a combined modulator. PITCH takes the amounts of each individual modulation source (as well as any pitch table information in the voice) and adds them together, taking the sum total as the modulation amount Applied to the filter cutoff frequency, this would cause notes to become brighter as you bend them upwards and more muted as you bend them down (or the opposite with negative modulation amounts), as well as adding any additional modulation source amounts to increase or decrease brightness. If a pitch table was employed, the brightness would increase and decrease with the individual pitch assigned to each note, in addition to the pitch wheel and other modulators.

- **WHEEL — Modulation Wheel**
  Controller information generated from a modulation wheel is assignable wherever a modulator is selected. To use a mod wheel for vibrato (one common application) WHEEL must be assigned to modulate the LFO, and the LFO Amount set to some number other than zero on the EDIT/Pitch page. The mod wheel's effect is positive-going only, from 0 (wheel towards you) to +99 (wheel away from you). Negative modulation amounts will reverse the effect.

- **PEDAL — Voltage Control Foot Pedal**
  This selects the optional *CVP-1 Foot Pedal*, which can be plugged into the Pedal•CV jack on the EPS-16 PLUS rear panel as a modulator. Its effect will be the same as that of the mod wheel. It can be applied wherever a modulator is selected.

  Note that the Foot Pedal will only act as a modulator when the Pedal Function Select parameter is set to PEDAL=MOD on the EDIT/System•MIDI page. When that parameter is set to PEDAL=VOL the Foot Pedal will act as a volume pedal, not as a modulator (though this has no effect on incoming MIDI Foot Pedal data). See *Section 2 — System Controls* for more details.

- **XCTRL — External Controller (MIDI only)**
  An external controller such as a Breath Controller, Data Entry Slider, etc., which is received via MIDI from another synthesizer or controller, can be assigned as a modulator within your EPS-16 PLUS instruments. On the MIDI Control page, you select the number of the external controller that will be recognized by the EPS-16 PLUS.

For example, if you have a keyboard with a Breath Controller,
- Connect its MIDI Out to the EPS-16 PLUS MIDI In;
- Make sure both instruments have controllers enabled (EDIT/System•MIDI page);
- Select Breath Controller as the external controller that will be received by the EPS-16 PLUS (XCTRL=02, also on the EDIT/System•MIDI page);
- Assign XCTRL as a modulator for LFO level, Filter Cutoff frequency, or some other manual level within a Wavesample, as shown later in this section; and
- Play the sound from the controller keyboard, while blowing into the Breath Controller connected to the sending instrument. The modulation will have the same effect as if you were playing from the sending instrument.

- **PRESS — Pressure (After-touch)**
  Pressure comes in two varieties — *Poly-Key*™ pressure (or Polyphonic pressure), which affects each note individually, and *Channel* pressure (or Mono pressure) which affects all notes that are playing when you exert pressure on any key. The EPS-16 PLUS receives both types via MIDI.

  There is a performance parameter on a sub-page of the EDIT/Instrument page which determines which of the two types of pressure will be used by the program. This control can also be set to NONE, in which case the program will not respond to pressure internally, nor will it send or receive it via MIDI. (See the discussion on Performance Parameters in *Section 3 — Instruments and Banks* for more details.)

  Note that not all sounds are necessarily programmed to respond to pressure. If pressure seems to have no effect when you play certain sounds, it is likely that the programmer did not assign pressure as a modulator anywhere within the program.

  The effect of pressure as a modulator is positive-going only, though assigning a negative modulation depth will cause increased pressure to reduce manual levels.

- **WL + PR — Wheel + Pressure**
  Another combination modulator. When selected, either mod wheel *or* pressure will affect the level which is being modulated. This can be good for modulating LFO depth when using the LFO for vibrato. That way the player can use either to get vibrato.

EDIT/Pitch Page

Use these parameters to adjust the pitch of the selected wavesample(s).



Use this page to change the root key and adjust its fine tuning. The root key is the key at which the sample plays back at the same pitch as it was taken.

Root key range: A0 to C8
Fine tune range: -99 to +99 cents



This parameter allows you to set the amount by which the LFO will affect pitch (for vibrato, etc.).

Range: -15.7 to +15.7 semitones



This parameter allows you to set the amount by which ENV1 will affect pitch.

Range: -15.7 to +15.7 semitones



Random is a noise generator. Its main use is to randomize or "humanize" the pitch. You can use it to modulate the filters, amplitude, etc. Random amount determines the depth of the modulation.

Random frequency range: 0 to 99
Amount: -99 to +99

EDIT PITCH	**PITCH BEND RANGE**
	Press Edit / Pitch / 6

This parameter allows you to set the pitch bend range on the Wavesample level. The default value is two semitones.

Range: 0 through 12 semitones

Note: When BEND RANGE=GLOBAL the Wavesamples bend range will default to the global setting on the EDIT/System page.

EDIT PITCH	**PITCH MOD; PITCH MOD AMOUNT**
	Press Edit / Pitch / 7

Use this page to assign one of fifteen modulators to the pitch of the oscillator, and to set the amount (depth) of that modulator.

Range: -99 to +99

EDIT PITCH	**WS RANGE LO; HI**
	Press Edit / Pitch / scroll using the arrow buttons

This parameter determines the key range the selected Wavesample will cover. Select the WS RNG LO parameter, play the key that you want to be the low key from the MIDI keyboard connected to the EPS-16 PLUS, the cursor will then automatically switch over to the HI parameter, which can then be set in the same fashion.

Note: As with the instrument key range, if you accidentally set the High Key *below* the Low Key, the selected Wavesample will not be heard

EPS-16 PLUS Envelopes

Each EPS-16 PLUS Wavesample has three envelopes. These envelopes are "hard wired" to the pitch, filter frequency, and amplitude of the Wavesample, though Env 1 and Env 2 can also be assigned elsewhere, wherever a modulator is selectable. The page button for each of the three envelopes is directly above that of the function it's associated with:

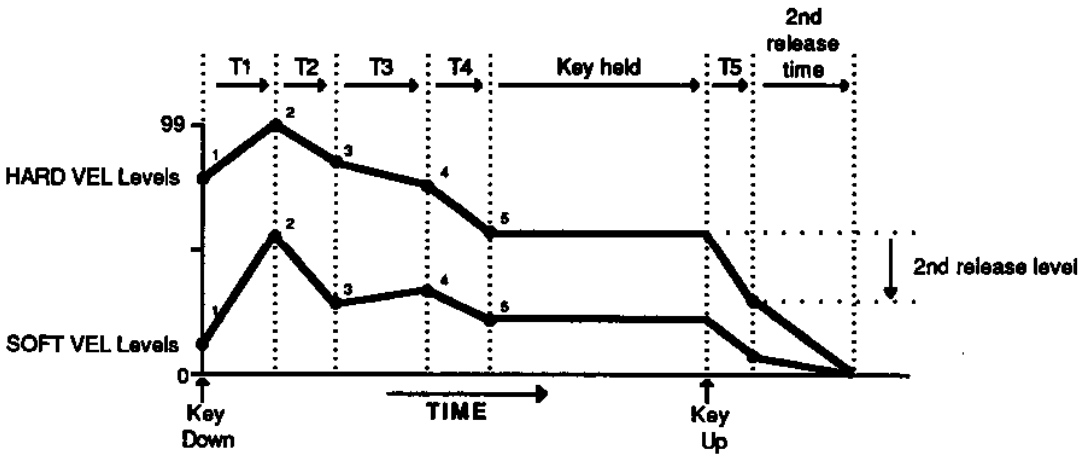
- Env 1 is routed to Wavesample pitch.
- Env 2 is routed to Wavesample filter frequency.
- Env 3 is routed to Wavesample amplitude (volume).

In the EPS-16 PLUS, the response of the Wavesample volume, ENV 3, and the Instrument mix level all use the same (non-linear) response curve. As shown below, setting any of these volume controls to 50 will attenuate a sound by 16 decibels.

ENV 3:

HARD OR SOFT LEVEL RESPONSE (dB)		LEVEL AMPLITUDE
99	0	dB
75		-8 dB
50		-16 dB
25		-32 dB
6		-56 dB
0		-oo

The indicator lights in the display tell you which one of the three Envelope pages you are on. For example when you arc on the EDIT/Env 2 page, the FILTER and ENV indicators are lit. The figure below shows a typical EPS-16 PLUS envelope shape:



The EPS-16 PLUS envelope is a descendant of the venerable ADSR (attack, decay, sustain, release) envelope, with a number of refinements. While the ADSR envelope gives you control over three time segments and one level, the EPS-16 PLUS envelopes have six time segments and six levels.

What's more, the envelope parameters allow you to describe two entirely different shapes; one for maximum velocity (HARD VEL) and one for minimum velocity (SOFT VEL). When a keydown is received, the envelope generator actually *interpolates* between the two, creating a curve that is a combination of the two based on the incoming velocity.

EDIT/Env 1, Env 2, Env 3 Page

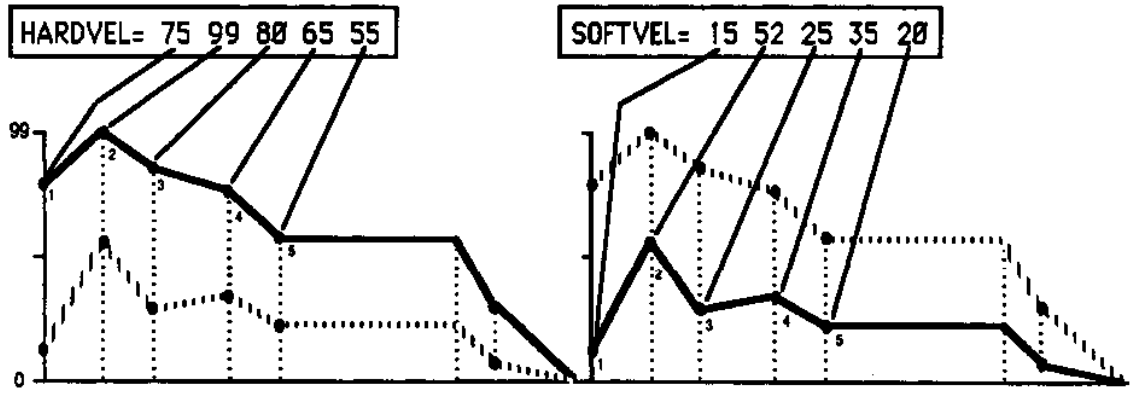
Use these parameters to adjust the envelopes. Each of the three Envelope pages (EDIT/Env 1, EDIT/Env 2, and EDIT/Env 3) contain the following parameters.

EDIT ENV	HARD VEL LEVELS
	Press Edit / Env1, Env2, or Env3 / 1

HARD VEL shows the five levels for the envelope used with maximum velocity. Level-1 is the initial level; in a traditional ADSR shape, Level-1 is always set to zero. Level-5 is the sustain level. The previous illustration demonstrates a HARD VEL curve.

EDIT ENV	SOFT VEL LEVELS
	Press Edit / Env1, Env2, or Env3 / 2

SOFTVEL shows the five levels for the envelope used with minimum velocity.



EDIT ENV **TIMES**

Press Edit / Env1, Env2, or Env3 / 3

TIMES shows five time parameters. The first four are the times between the five levels. The fifth time is the (first) release time.

ENVELOPE TIMES

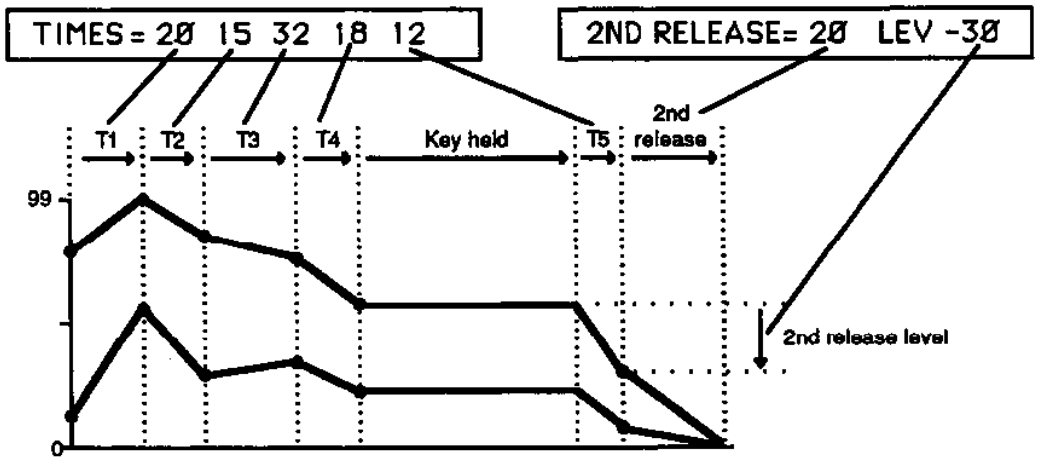
value	time (in sec)	value	time (in sec)	value	time (in sec)	value	time (in sec)	value	time (in sec)
0	.00	20	.20	40	.82	60	3.2	80	13
1	.01	21	.22	41	.88	61	3.5	81	14
2	.02	22	.23	42	.94	62	3.7	82	15
3	.03	23	.25	43	1.0	63	4.0	83	16
4	.04	24	.27	44	1.0	64	4.3	84	17
5	.06	25	.29	45	1.1	65	4.6	85	18
6	.07	26	.31	46	1.2	66	4.9	86	19
7	.08	27	.33	47	1.3	67	5.3	87	21
8	.08	28	.35	48	1.4	68	5.7	88	22
9	.09	29	.38	49	1.5	69	6.1	89	24
10	.10	30	.41	50	1.6	70	6.5	90	26
11	.11	31	.44	51	1.7	71	7.0	91	28
12	.11	32	.47	52	1.8	72	7.5	92	30
13	.12	33	.50	53	2.0	73	8.1	93	32
14	.13	34	.54	54	2.1	74	8.6	94	34
15	.14	35	.58	55	2.3	75	9.3	95	37
16	.15	36	.62	56	2.4	76	9.9	96	39
17	.16	37	.66	57	2.6	77	10	97	42
18	.17	38	.71	58	2.8	78	11	98	45
19	.19	39	.76	59	3.0	79	12	99	49

EDIT ENV **2ND RELEASE (Time); 2ND RELEASE (Level)**

Press Edit / Env1, Env2, or Env3 / 4

2ND RELEASE time and 2nd release LEVEL provide one more breakpoint in the envelope, which occurs *after* the release (T5). The LEVEL controls where the breakpoint will be placed *relative to the current value of the envelope* at the time the key was released.

The diagram on the following page illustrates how the 2nd RELEASE and LEVEL affect both the HARDVEL and SOFTVEL levels of an envelope.



EDIT ENV	**ATTACK TIME VELOCITY**
	Press Edit / Env1, Env2, or Env3 / 5

ATTACK TIME VELOCITY makes time 1 shorter with increasing velocity.

Range: 00 to 99

EDIT ENV	**KBD TIME SCALING**
	Press Edit / Env1, Env2, or Env3 / 6

KEYBOARD TIME SCALING makes the envelope shorter for keys above the root key. Keys below the root key will have longer envelopes; the root key is not affected by this parameter. 2ND RELEASE TIME is not affected by this parameter.

EDIT ENV	**SOFT VEL CURVE**
	Press Edit / Env1, Env2, Env3 / 7

This parameter determines at what velocity level the envelopes switch from using the SOFTVEL settings to the HARDVEL settings. There are four settings:

- OFF — The envelope uses only the HARDVEL levels, regardless of velocity.
- VEL, VEL1, VEL2 — These settings use the velocity response curves illustrated in the discussion on modulators at the beginning of this section.

EDIT ENV	**ENVELOPE MODE**
	Press Edit / Env1, Env2, or Env3 / 8

ENVELOPE MODE has three states:

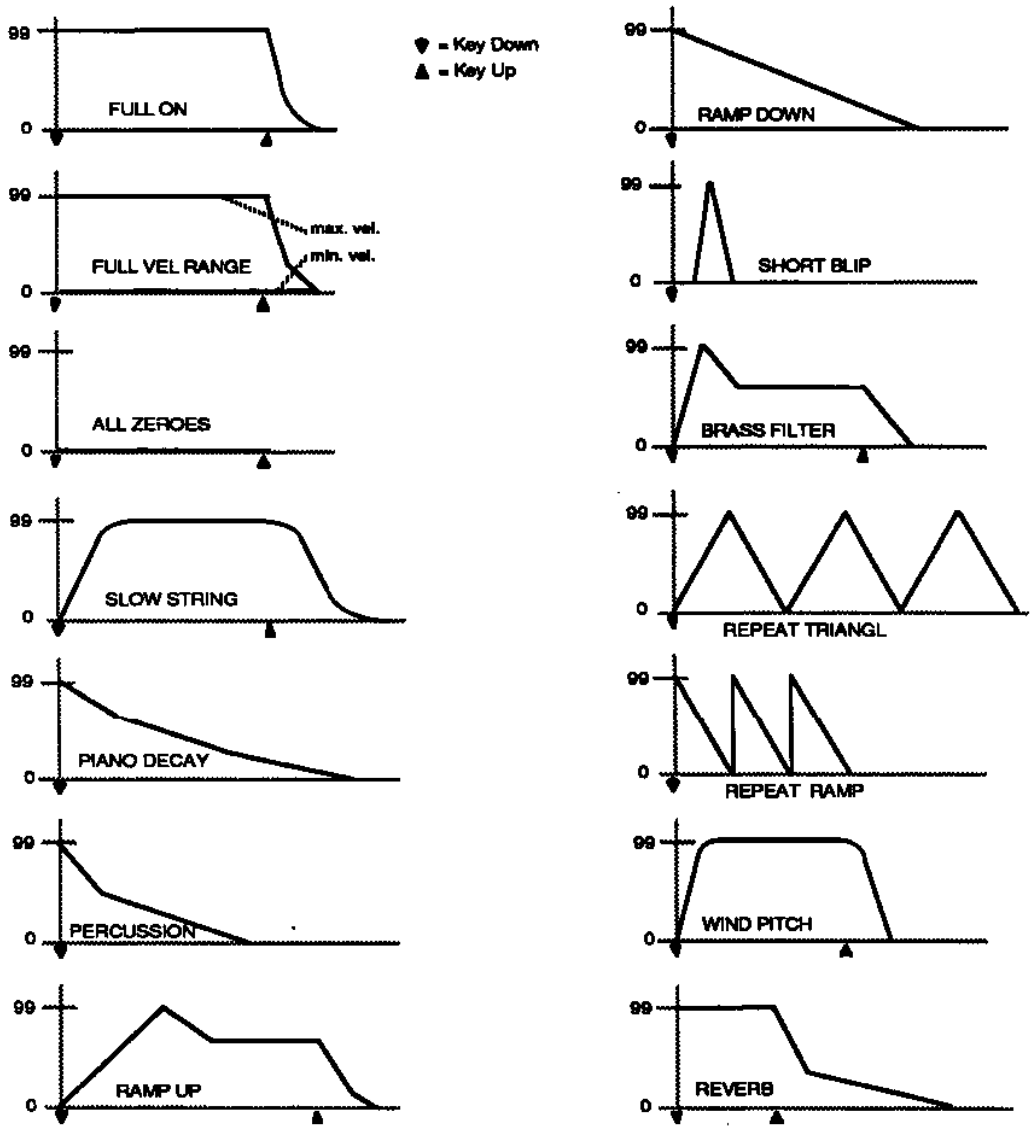
- NORMAL: as pictured in the previous envelope diagrams.
- CYCLE: envelope runs its full cycle, ignoring the key-up event.
- REPEAT: In this mode, the envelope will run through levels 2 through 5, using times 1 through 4, repeatedly as long as the key is down.

EDIT ENV	**ENVELOPE=**
	Press Edit / Env1, Env2, or Env3 / 0

The last parameter on the Envelope page usually reads ENVELOPE==CURRENT VALUE. This is the envelope template parameter.

There are a number of "typical" envelopes permanently stored in the EPS-16 PLUS; they each have a name. When you select one of these envelopes, its twenty-one parameters are *copied* into the envelope of the Wavesample or Wavesamples you are editing. The old values are temporarily saved as the CURRENT VALUE. You can go back to CURRENT VALUE any time you wish, unless you change any of the values in one of the template envelopes. Editing individual parameters of *any* envelope causes it to become the CURRENT VALUE of that particular envelope.

The diagram on the following page illustrates the fourteen typical envelopes.



Copying Envelopes

Pressing *Enter•Yes* while on the envelope template page causes the current set of parameters to be saved in a special buffer. The message ENVELOPE PARAMETERS SAVED will appear briefly. There is only one SAVED envelope in the entire EPS-16 PLUS at any one time. This envelope becomes your own template, which can be selected on the envelope template page by selecting ENVELOPE=SAVED. You can use this function to copy an envelope from one Wavesample to another.

EDIT/LFO Page

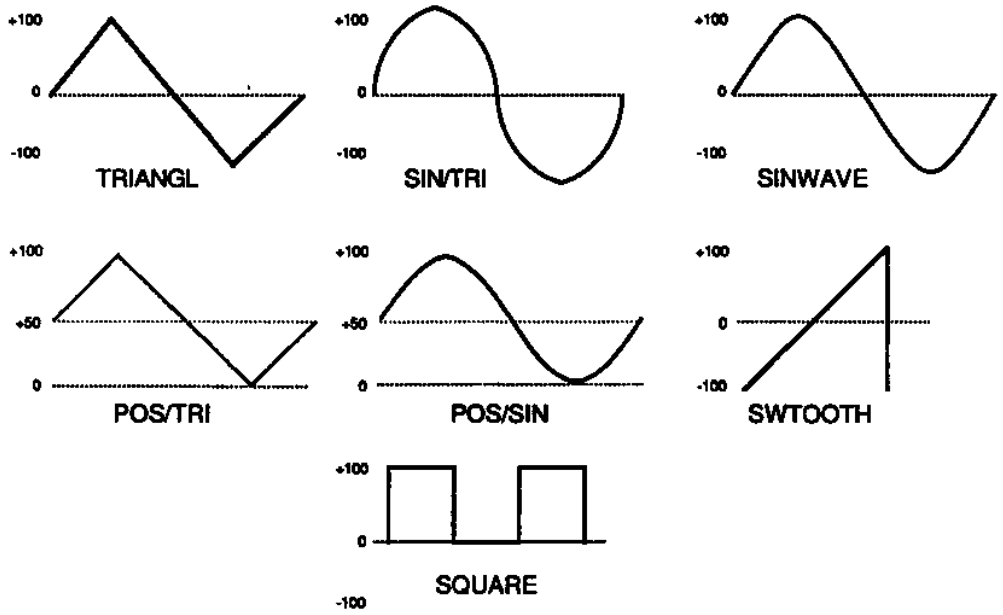
The parameters on this page control the Low Frequency Oscillator (LFO) that can be used to create vibrato, tremolo and other effects. To access these parameters press *Edit,* then *LFO.*

EDIT LFO	LFO WAVE; SPEED
	Press Edit / LFO / 1 (for Wave) 2 (for Speed)

LFO Wave

Use this page to select one of the seven LFO waveforms:

- TRIANGL — the triangle wave is commonly used to modulate the pitch to produce vibrato.
- SIN/TRI — a mixture of a sine and triangle wave, a sort of pointy sine wave.
- SINWAVE — the sine wave is a pure fundamental frequency, more abrupt in its peaks and valleys than the triangle wave.
- POS/TRI — the POS/TRI is a positive-only triangle wave useful for simulating vibrato on instruments like the guitar where vibrato techniques are limited to bending the note up.
- POS/SIN — the POS/SIN is positive-only sine wave, similar in application to the POS/TRI.
- SWTOOTH — the sawtooth wave is commonly used for special effects.
- SQUARE — the square wave is useful for producing trill effects.



LFO Speed

This parameter allows you to set the speed of the LFO, making the vibrato faster or slower.

Range: 0 to 99

LFO FREQUENCIES

value	time (in Hz)	value	time (in Hz)	value	time (in Hz)	value	time (in Hz)	value	time (in Hz)
0	.05	20	1.25	40	6.25	60	11.25	80	16.25
1	.05	21	1.50	41	6.50	61	11.50	81	16.50
2	.06	22	1.75	42	6.75	62	11.75	82	16.75
3	.06	23	2.00	43	7.00	63	12.00	83	17.00
4	.06	24	2.25	44	7.25	64	12.25	84	17.25
5	.07	25	2.50	45	7.50	65	12.50	85	17.50
6	.07	26	2.75	46	7.75	66	12.75	86	17.75
7	.08	27	3.00	47	8.00	67	13.00	87	18.00
8	.08	28	3.25	48	8.25	68	13.25	88	18.25
9	.09	29	3.50	49	8.50	69	13.50	89	18.50
10	.10	30	3.75	50	8.75	70	13.75	90	18.75
11	.11	31	4.00	51	9.00	71	14.00	91	19.00
12	.13	32	4.25	52	9.25	72	14.25	92	19.25
13	.14	33	4.50	53	9.50	73	14.50	93	19.50
14	.17	34	4.75	54	9.75	74	14.75	94	19.75
15	.20	35	5.00	55	10.00	75	15.00	95	20.00
16	.25	36	5.25	56	10.25	76	15.25	96	20.25
17	.33	37	5.50	57	10.50	77	15.50	97	20.50
18	.50	38	5.75	58	10.75	78	15.75	98	20.75
19	1.0	39	6.00	59	11.00	79	16.00	99	21.00



LFO Depth

Depth controls the initial amount of LFO. The effect of any LFO modulator will be added to this amount

Range: 0 to 99

LFO Delay

Delay controls when the LFO will start. This is useful for creating delayed vibrato, tremolo, etc.

Range: 0 to 99



Use this page to set the LFO in one of three modes:

- RESET OFF — The LFO will cycle continuously without resetting.
- RESET ON — The LFO waveform will return to the beginning of its cycle each time a new key is struck,
- HUMANIZE — The LFO will speed up and slow down randomly, making it possible to add a "human" quality to sounds.



This page allows you to select a modulation source and the modulation amount for LFO DEPTH. The effect of LFO MOD is *added* to the effect of the LFO DEPTH parameter. Either parameter can trigger the LFO. If you have the LFO DEPTH set to zero, you can still get LFO modulation by using any of the modulation sources on this page. Any of the fifteen available modulators can be applied to modulate the LFO Depth.



This parameter allows you to select a modulation source and the modulation amount for the LFO Speed The effect of RATE MOD is *added* to the effect of the LFO SPEED parameter. Any of the fifteen available modulators can be applied to modulate the LFO Speed.

About Filters

Each voice of the EPS-16 PLUS' twenty voices has its own pair of digital filters, F1 and F2, which are connected in series. The filter settings determine which frequencies will be allowed to pass through to the output,

Low-Pass and High Pass

A low-pass filter allows only those frequencies below the filter cutoff frequency to pass—higher frequencies are filtered out. The reverse is true for the high-pass filters. In the EPS-16 PLUS, the first filter (F1) is always a low-pass filter. The second filter (F2) can be either a high-pass or low-pass filter.

Poles: Rolloff Curves

"Pole" is an engineering term that describes the steepness of a filter. Each additional pole gives a filter a steeper rolloff curve. In the EPS-16 PLUS, four poles are available, but they are divided between two filters; either as 2 and 2, or as 3 and 1. A single-pole filter will rolloff at 6 dB per octave; a 2- pole, 12 dB per octave; a 3-pole, 18 dB per octave; and 4-pole, 24 dB per octave. To reproduce a 4-pole low-pass filter (for that "classic" analog synth sound) you would set both low-pass filters to roll off at 12 dB per octave, resulting in a 24 dB per octave rolloff.

Cutoff Frequency

Every filter has a "knee" in the response curve, known as the cutoff frequency. The filter cutoff frequency can remain fixed over time, or it can be varied by modulating the filter with an envelope, LFO, velocity, etc. You can create some very interesting filter configurations by using a different modulator for each filter. For instance, try using pressure to modulate the filter. You can drive one filter up with pressure, while simultaneously driving the other down.

EDIT/Filter Page

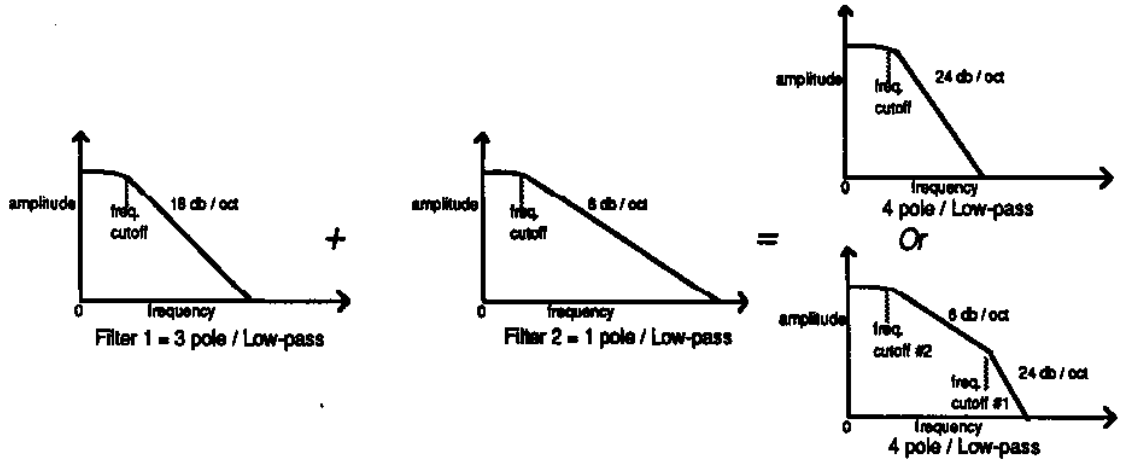
Use these parameters to adjust the filters.

EDIT FILTER	MODE (Filter Mode)
	Press Edit / Filter / 0

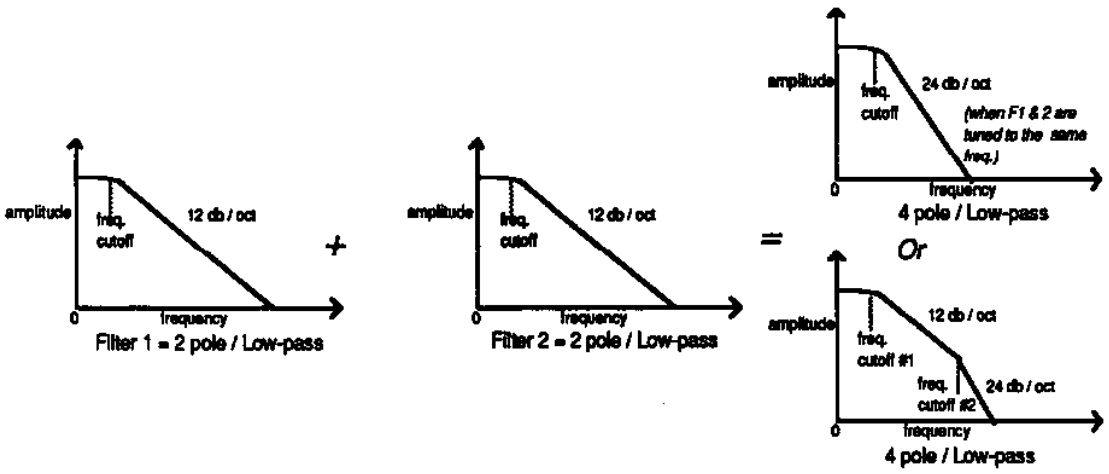
Use this parameter to choose one of the four filter modes.

On the left are the response curves of the two filters shown separately. On the right are some possible shapes of the combined filters.

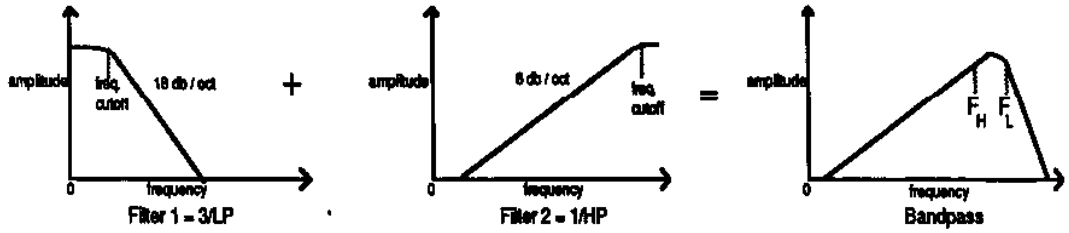
- MODE F1=3/LP F2=1/LP. F1 is a 3 pole low-pass filter. F2 is a 1-pole low-pass filter.



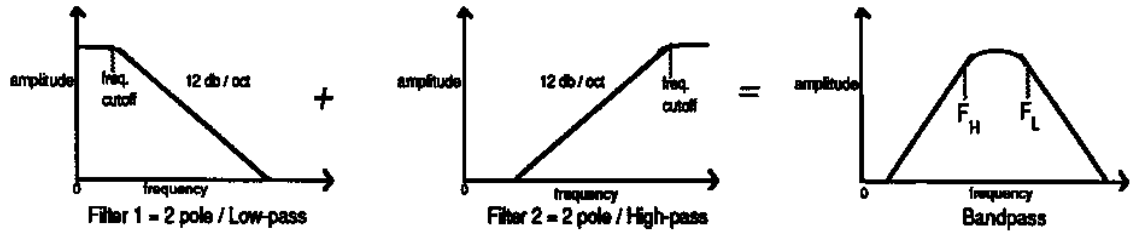
• MODE F1=2/LP F2=2/LP. F1 is a 2-pole low-pass filter. F2 is also a 2-pole low-pass filter.



• MODE F1=3/LP F2=1/HP. F1 is a 3-pole low-pass filter. F2 is a 1-pole high-pass filter.



• MODE F1=2/LP F2=2/HP. F1 is a 2-pole low-pass filter. F2 is a 2-pole high-pass filter.





This parameter allows you to set the initial filter cutoff frequency. With a low-pass filter, a setting of 127 lets all the original signal pass through the filter. With a high-pass filter, a setting of 0 lets through all of the original signal. This setting represents the "filter floor." The effect of any selected modulators will be added to (or subtracted from) this level.

Range: 0 to 127



Use this parameter to set the depth or amount by which Env 2 will modulate the filters. Modulation amounts can be positive or negative.

Range: -99 to +99



This parameter sets the amount by which the location of a note on the MIDI keyboard connected to the EPS-16 PLUS will modulate the filter cutoff frequency (keyboard filter tracking). This allows the relative brightness of a sound to remain constant over the keyboard. To track the keyboard exactly you should set KBDAMT to +50.

Range: -99 to +99



Use this page to assign a modulator to the filter one as well as the amount of effect that modulator will have. Any of the fifteen available modulators can be applied to modulate the Filter 1 cutoff frequency. Modulation amounts can be positive or negative.

Range: -99 to +99



This parameter serves the same function as F1 MOD; F1 MOD AMOUNT, but controls filter two. It operates in an identical fashion. Any of the fifteen available modulators can be applied to modulate the Filter 2 cutoff frequency.

EDIT/Amp Page

The parameters on this page control the amplitude (or volume) of the Wavesample.



Wavesample Volume

Use this parameter to set the volume of an individual Wavesample.

Range: 0 to 99

Wavesample Pan

Use this parameter to assign a Wavesample to a location in a stereo field; either within the main outputs, or any of the pairs of auxiliary outputs.

Range: -99 (full Left) to +99 (full Right)



This page allows you to assign a modulator to control the volume of an instrument, layer, and/or Wavesample and determine how much the selected mod will affect it Any of the fifteen available modulators can be applied to modulate the volume of the Wavesample.



This page allows you to assign a modulator to control the panning of an instrument, layer, and/or Wavesample. Any of the fifteen available modulators can be applied to modulate the pan position of the Wavesample.





Volume Modulator Crossfade Breakpoints

The Crossfade breakpoints (A and B, C and D) allow you to scale the effect of the volume modulator, to create keyboard, velocity, or other types of crossfades. Using the Crossfade breakpoints, you can customize how the volume modulator (also selected on the EDIT/Amp page) will affect the volume of the Wavesample.

This lets you use velocity, keyboard position, pressure or any other modulator to Crossfade between Wavesamples.

Note: Whenever you Crossfade between Wavesamples, the Wavesamples must be in different layers, since only one Wavesample can occupy a given key within a single layer.

Tutorial — Keyboard Crossfade

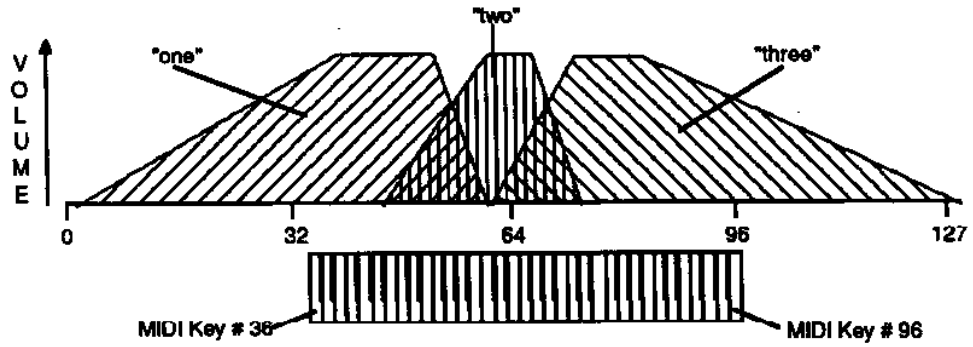
We'll use the Crossfade breakpoints to create a keyboard Crossfade. First, create three samples in three layers:

- With a microphone connected to the Audio In of the EPS-16 PLUS, press *Sample,* then pick a sample instrument. Press *Enter•Yes* and say "one," then press *Cancel•No* to stop sampling. Make the lowest C on the keyboard the root key for sample "one" in layer 1.
- The next sample will be in a NEW layer. Press *Sample,* then pick the same sample instrument Underline LYR=1 and change that to LYR=N. Press *Enter•Yes* twice (unless you want to make adjustments to the Level-Detect Mode). Say "two." Press *Cancel•No* and assign the root key to middle C (two octaves above the lowest C). That's sample "two" in layer 2.
- Press *Sample,* then pick the same sample instrument. Underline LYR=2 and change that to LYR=N. Press *Enter•Yes* twice, and say, "three" into the microphone. Press *Cancel•No* and assign the root key to the C two octaves above middle C. Sample "one" is in the bottom third of the keyboard. Sample "two" is in the middle third, and sample "three" is in the top third.

Press the *Edit* button which takes you to the EDIT page. Adjust the parameters in the display so they read UNNAMED I LYR=1 WS=ALL. Press the *Amp* button. You are now on the EDIT/Amp page. Scroll right to VOLUME MOD and adjust the parameters so the display reads VOLUME MOD=KBD • 0. This selects KBD (keyboard) as the volume modulator. Underline the number in the display and change it to 99. The display will read VOLUME MOD=KBD • 99. Scroll right to A-B FADE IN and set the parameters in the display to read, A-B FADE IN=0 40. Scroll right one more page, and set the parameters in the display to read, C-D FADEOUT=50 60. Press the *Edit* button to return to the EDIT page. Underline LYR=1 in the display and change that to LYR=2. The display now reads UNNAMED I LYR=2 WS=ALL.

Press the *Edit* button to return to the EDIT/Amp page. Scroll right to the VOLUME MOD page, and set it to VOLUME MOD=KBD • 99. Scroll right to the A-B FADE IN page and set it to A-B FADE IN =45 55. Scroll right to the C-D FADE OUT page and set it to C-D FADE OUT=65 75.

Press the *Edit* button and set the parameters in the display to read UNNAMED I LYR=3 WS=ALL. Press the *Edit* button again to return to the EDIT/Amp page. Scroll right to VOLUME MOD, and set it to VOLUME MOD=KBD • 99. Scroll right to A-B FADE IN and set the parameters to A-B FADE IN=60 70. Scroll to C-D FADE OUT and set it to C-D FADE OUT=80 127. The diagram on the following page illustrates the keyboard Crossfade that you have now constructed:



As you play chromatically up the MIDI keyboard connected to the EPS-16 PLUS you will hear the three different Wavesamples fading in and out The voice samples could have been piano or synthesizer samples, and the result would have been the same. The keyboard was used as the Volume Modulator, and the Crossfade Breakpoint parameters enabled you to blend the samples together seamlessly.

Note that when the keyboard is used in this way, the numbers selected for A, B, C, and D refer to MIDI key numbers. The low C on the EPS-16 PLUS keyboard is MIDI key #36; the high C is MIDI key number 96. Middle C is MIDI key # 60. And so on. (The keys of an 88-note piano-style keyboard go from MIDI key 21 to MIDI key 108.)

Although the Crossfade described above uses the keyboard to determine the breakpoints, any of the available modulators found on the Volume Modulator parameter can be used.

EDIT AMP	**FADECURVE**
	Press Edit / Amp / 5

This parameter determines what type of curve will be used when fading samples in and out between breakpoints. There are two possible fadecurves:

- CROSSFADE — This curve features a steep initial rise and drop off between the two samples. It is best used when a quick change between samples is desired, as in a keyboard or velocity Crossfade.

- LINEAR — This curve ramps up and down evenly, making it preferable when smoother transitions between Wavesamples are appropriate, such as when using pressure to Crossfade.

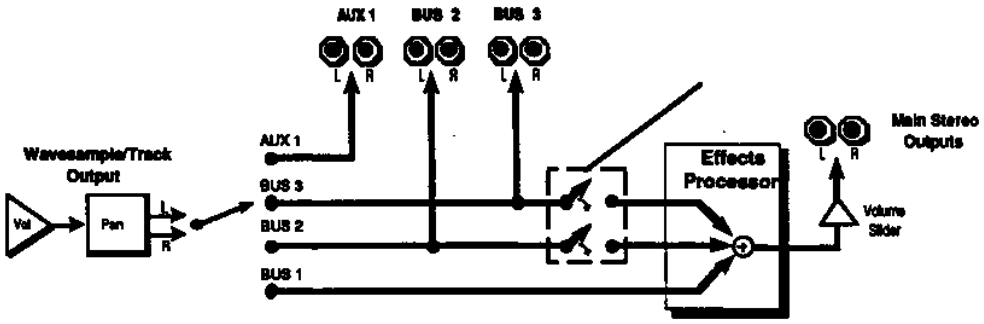
EDIT AMP	**BOOST**
	Press Edit / Amp / 6

Setting this parameter to ON gives the selected Wavesample a +12dB boost Be careful that adding boost to a sample doesn't cause it to become too loud and clip.

EDIT AMP	OUT
	Press Edit / Amp / 9

This parameter enables you to assign instruments, Wavesamples, or layers to any of the four stereo sends, which we call output busses. An understanding of how these buses are routed to the auxiliary outputs, as well as the EPS-16 PLUS' left/right stereo outs, is critical in getting the most flexibility out of your EPS-16 PLUS.

The diagram below illustrates how voices are routed through the four buses to the Effects Processor and main and auxiliary outputs.



The four output buses work as follows:

- BUS 1 — Sounds assigned to this bus will always go to the EPS-16 PLUS'S internal effects processor and on to the main audio outputs.
- BUS 2 — BUS 2 is "shared" by the internal effects and the auxiliary outputs marked BUS 2 on the back of the EPS-16 PLUS. Sounds assigned to this bus will *always* go to the BUS 2 auxiliary output, but can be switched out of the EPS-16 PLUS'S internal effects processor (and thus the main outputs) by turning the FX SEND BUS 2 parameter on the EDIT/System•MIDI page to OFF (see the discussion on the FX SEND BUS2/3 parameter in *Section 2 — System Control* for more details).
- BUS 3 — BUS 3 is "shared" by the internal effects and the auxiliary outputs marked BUS 3 on the back of the EPS-16 PLUS. Sounds assigned to this bus will *always* go to the BUS 3 auxiliary output, but can be switched out of the EPS-16 PLUS'S internal effects processor (and thus the main outputs) by turning the FX SEND BUS 3 parameter on the EDIT/System•MIDI page to OFF (see the discussion on the FX SEND BUS2/3 parameter in *Section 2 — System Control* for more details).
- AUX 1 — Sounds assigned to this bus will *always* go to the auxiliary output marked AUX 1 on the back of the EPS-16 PLUS, and only to that output
- ROTATE — This selection switches the voice between BUS 1, BUS 2, and BUS 3 in a rotating sequence each time the voice is played.

As shown in the diagram above, the signal is routed to the auxiliary outputs *before* going into the effects processor. Therefore, the signal out of the auxiliary outputs is always dry (no effects).

EDIT/Layer Page

Use this page to adjust parameters which affect the layers within an instrument. To access these parameters press *Edit*, then *Layer*.



Use this parameter to create a portamento glide between notes. This is a monophonic effect that is triggered when you play legato notes. When set to PEDAL, you must play legato notes (or sustained notes) and depress the foot pedal to start the glide.

- MONO — Enables monophonic voice assignment, allowing only one voice to be active in the layer. If a key down is received before another is released, the voice will glide from the old note to the new one.
- PEDAL — Enables the sustain pedal to start the polyphonic glide. In this mode, the glide is controlled by the sustain pedal. When the pedal is up, there is no glide and the layer if fully polyphonic. When the sustain pedal is depressed, the glide is enabled and the polyphony is limited to the number of notes being sounded at the moment. For example, with the pedal up play a three note chord. Press the sustain pedal and lift your fingers off the keys (the three notes will sustain). Now press another key. One of these sustaining notes will glide to the new note, keeping a key down will prevent a note from being stolen. This allows controlled voice leading.
- TRIGGER — This mode plays monophonically, with the envelope and Wavesample retriggering, or restarting, each time there is a new key down.
- MINIMODE — Similar to mono mode on old analog synths. The voice will play with one-voice polyphony and new notes will always glide from the previous note (assuming GLIDE TIME is greater than zero). If you just want mono voice assignment without glide, set LYR GLIDEMODE=MINIMODE and set the GLIDETIME to zero.



Use this parameter to set the speed of the glide between notes. Lower values yield a faster glide; higher numbers, a slower glide.

Range: 0 to 127



The legato layer is an ENSONIQ innovation that enables the EPS-16 PLUS to capture the elusive nuances of acoustic instruments. The sound of a wind instrument, the flute for example, is different when it is "tongued" than when notes are played in a connected manner (called legato). When two notes are "slurred" or "trilled" the characteristic attack of the second note is not present The EPS-16 PLUS allows a simulation of this effect when used with one of the glide modes.

The rules for glide, described above, determine when two notes will be connected The glide time determines how fast it will get to the new note. The legato layer parameter selects which layer, and therefore what sound, will play on the new note.

For example, suppose that layer one is a flute sample with a tongued attack, and layer two is a flute sustain without any attack. To use this function:

On the EDIT/Instrument page:
- Enable both layer one and the layer two in the patch. The display reads 00 PATCH=1 2 - - - - - -
- Enable layer one, the attack, as a kcydown layer. Disable layer two as a keydown layer. The display reads KEYDWN LAYERS=1 - - - - - - -

On the EDIT/Layer page for layer one:
- Set layer GLIDEMODE=MONO.
- Set LEGATO layer=2.
- Adjust GLIDETIME as you see fit



This parameter allows you to set the velocity range in which the layer will respond. Outside the range selected, the layer will not play.

Tutorial — Velocity and Layers

This tutorial will give you an example of how velocity can be used to call up layers:

- Press the *Sample* button, and pick a sample instrument. Press *Enter•Yes* and say "one," then press *Cancel•No* to stop sampling. Make middle C the root key. That is layer one.
- Press the *Sample* button again, pick the same sample instrument. The display reads UNNAMED I LYR=1 WS=NEW. Underline LYR=1, and set it to LYR=N. Press *Enter•Yes.* Press *Enter•Yes* again and say "two." Make middle C the same root key. That is layer two.
- Press the *Sample* button, then pick the same sample instrument. Underline LYR=2 in the display, and change it to LYR=N. Press *Enter•Yes* twice, and say "three." That is layer three. Again, select middle C as the root key. When you play middle C, you will hear samples, "one, two, and three," in layers one, two, and three.

Now that we have our Wavesamples, the LAYER VELOCITY parameter can be used.

- Press *Edit.* This places you on the Wavesample select page. Using the *Data Entry Slider* or *Arrow* buttons, adjust the page so the screen reads, UNNAMED I LYR=1 WS=ALL.
- Press the *Layer* button. This will take you to the EDIT/Layer page. Scroll to the LYR VEL screen and underline and adjust this parameter so it reads LYR VEL LO=0 HI=42.
- Press the *Edit* button again, which takes you back to the EDIT page. Underline LYR=1 in the display and change it to LYR=2. The complete display reads UNNAMED I LYR=2 WS=ALL. Pressing the *Edit* button takes you back to the EDIT/Layer page (the *Edit* button acts as a toggle).
- Set the EDIT/Layer parameters to LYR VEL LO=42 HI=85. Press the *Edit* button again, to return to the EDIT page. Underline LYR=2 and set it to LYR=3. Press the *Edit* button to toggle back to the EDIT/Layer page. Set these Parameters to LYR VEL LO=86 HI=127.

All three Layers are now set to respond to velocity. A layer will only play when the velocity is within the range specified on this page. A soft attack will call up sample "one," a medium attack, sample "two," and a hard attack, sample "three." Remember, you can do this with up to eight layers.

Range: 0 to 127



This parameter determines whether a layer will use a STANDARD (equitempered) pitchtable, or have middle C across the keyboard (NO PITCH), or will use any pitch table you create. See the discussion on CREATE PITCH TABLE on the COMMAND/Pitch page in *Section 6 — Wavesample Parameters* for more on creating and editing pitch tables.



You can use the data entry controls to change the name of an existing layer, or name a new one that you've just created.



The DELAY parameter determines how long voices within the selected layer will wait after a key is struck before playing. Adjustable from 0 to 5000, with each value increasing the delay by 1 millisecond.

The VELOCITY AMOUNT is a modulation amount, with velocity serving as the fixed modulation source. Haider velocities will increase the delay time based on this amount



This parameter sets the amount of decay voices within the selected layer will have after they have been restruck. The higher the value, the longer the decay time.

Range: 00 to 99

COMMAND/Layer Page

These commands allow you to create, copy, and delete whole layers.



Use this command to create a new layer in the currently selected instrument

- Select CREATE NEW LAYER.
- Press *Enter•Yes.* The display reads LAYER ## CREATED.



Use this command to copy an existing layer and all the Wavesamples in it, either within an instrument or from one instrument to another.

- Select COPY LAYER. The display reads TO INST=UNNAMED INST.
- Select the destination instrument. Press *Enter•Yes.*
- Select COPY=PARAMS ONLY/PARAMS+DATA. It is a good idea to choose PARAMS ONLY when copying a layer within the same instrument, allowing the wave data to be shared. This will conserve memory. However, *always* choose PARAMS+DATA when copying a layer from one instrument to another, or else the destination instrument will not contain the wave data when it is saved to disk, and subsequently reloaded.
- Press *Enter•Yes.* The display reads LAYER ## CREATED.



Use this command to delete a layer in the currently selected instrument

- Choose the layer you want to delete.
- Select DELETE LAYER.
- Press *Enter•Yes.* The display reads DELETE LAYER ##.
- Press *Enter•Yes* or *Cancel•No.*

Note: If you get the message NO EDIT LAYER SELECTED, simply press *Edit* and select the layer you want to copy or delete, and then proceed with the command.

Section 8 — Sequencer Basics

This section contains an introduction to the EPS-16 PLUS sequencer and all the information you'll need to get started sequencing. More advanced functions are covered in *Section 9 — Sequencer Edit Functions* and *Section 10 — Sequencer Applications.*

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Sequencing on the EPS-16 PLUS

The EPS-16 PLUS sequencer incorporates a range of features and capabilities you would expect to find in stand-alone or computer sequencers, yet with the advantage of an integrated system.

The EPS-16 PLUS is both powerful and easy to use — having your sampler and sequencer right at your fingertips in one unit is what makes the ENSONIQ approach to digital sequencing so intuitive and efficient

If you can't wait to start sequencing, you can turn right to "Recording a Sequence" later in this section. We recommend, however, that you come back and familiarize yourself with the many other sequencer controls and functions described in this section. This is the only way to truly take advantage of the power of the EPS-16 PLUS sequencer.

The MIDI Connection

Almost everyone is familiar by now with MIDI — that magical connection that lets you play one instrument (or a whole roomful of them) from another. MIDI — Musical Instrument Digital Interface — is a standard that has been agreed upon by manufacturers for translating musical events into specific numbers which are transmitted and received by MIDI instruments.

When you play middle C on the MIDI keyboard connected to the EPS-16 PLUS, for instance, it instantly sends to its MIDI Out jack a series of numbers representing a *Key Down* event, along with the location of the note on the keyboard and how hard the key was struck. When you release the key it sends the EPS-16 PLUS a number meaning *Key Up*. The EPS-16 PLUS can receive and translate those numbers, and will play the middle C itself. The same thing happens whenever you move a controller, such as the pitch or mod wheel, or when you select a new sound — each of these events is translated into a series of numbers which are transmitted by the MIDI Out jack.

Digital Sequencing

Now imagine a recorder which, instead of recording the sounds of an instrument, records the same kind of digital information that is sent and received over MIDI — key down, key up, key number and velocity, pitch bend, mod wheel, program changes and so on — and you have imagined a *digital sequencer*.

A sequencer records and plays back the "control information" rather than the actual notes. This means that there is no degradation of the sound in the recording process no matter how many times you overdub or re-record a part. A sequencer is sort of like an electronic player piano.

It is important to bear in mind that a sequencer only records what you play. Sequencer memory is used up on the basis of *Events* (keys struck, controllers, etc.), while a tape recorder's memory (the tape) is always used up by the same amount over a fixed period of time.

This means that a sequencer will use virtually the same amount of memory to record 100 notes, whether you play those notes over ten seconds or ten minutes. When you strike a key, the sequencer records a *Key Down* event. It then counts the *clock* pulses until you release the key, when it records a *Key Up* event The amount of time between the key down and the key up doesn't really affect the amount of memory required to record the note. Compare this to an audio tape recorder. With tape, *time* is the main factor. A tape recorder will use the same amount of tape to record a minute of music, whether the signal contains one note or one hundred.

You might say that tape is *linear* — it is spent at a fixed rate — while digital sequencer memory is *dynamic* — it is used only as needed Understanding the difference will help you to manage the EPS-16 PLUS sequencer memory. For example, while key events (the notes you play) use up relatively little memory each, controllers such as pressure, mod wheel, pitch bend, etc., are recorded as a flood of numbers which can fill up the memory in a hurry. Thus if you're trying to squeeze one more track into a sequence when there is not much memory left, you should go easy on the controllers.

What is a Sequence?

A sequence on the EPS-16 PLUS is a collection of eight independent tracks and their associated notes, controllers, etc.

The EPS-16 PLUS can have up to 80 sequences in its internal memory at once. Each sequence has a 12-character name, which you give to it when you create it. A sequence can be up to 999 bars long.

You select the current sequence (which sequence you want to play or record) on the EDIT/Seq•Song page. Press *Edit,* then double-click on *Seq•Song* to go directly to the Select Seq/Song page.

You can save an individual sequence to disk, though in most cases it is more useful to save the entire song with all its related sequences.

What is a Song?

The sequences in memory can be chained together into a song. There can only be one song in memory at a time. The song also has a 12-character name which you can edit.

The song is selected on the EDIT/Seq•Song page just as you would select a sequence. When the song is selected, the SONG indicator lights on the display.

In Song mode, sequences are assigned to play consecutively in any order, with up to 99 *Steps*, and up to 99 *Repetitions* of each step. Within each song step, individual tracks within the sequence can be muted or transposed.

After chaining together sequences into a song, you can record another complete set of song-length tracks which are separate from the individual sequence tracks, but which share the same instruments. These "Song Tracks" are stored with the song. This makes the EPS-16 PLUS sequencer in effect a sixteen-track recorder (see Song Mode later in this section).

When you save a song to disk (using the SAVE SONG + ALL SEQS command on the COMMAND/Seq•Song page), the EPS-16 PLUS automatically saves all the sequences currently in memory along with the song (it doesn't save the instruments, though: they must be saved separately). When you later load the song into memory (by itself or as part of a bank), all the sequences will be loaded in along with it.

Banks

The way to make sure that all the instruments are loaded into the proper locations, all the mix and pan levels for each track are properly preserved, and that the proper effect and related settings are in place is to save the whole contents of the EPS-16 PLUS memory as a bank (see *Section 3 — Instruments and Banks)*. Loading a bank file (instead of loading the song and the various instruments separately) ensures that every instrument will be loaded into the the proper Instrument•Track location so that the tracks are all playing the right thing.

Sequencer "Transport Controls"

The three buttons to the right of the display serve to start and stop the sequencer, and to put it into Record and Overdub modes. In addition to these three buttons, the Auxiliary Foot Switch (available only when an optional SW-5 dual-pedal Foot Switch is connected to the EPS-16 PLUS) can be used to start and stop the sequencer when both hands are busy.



- Pressing *Play* will start the current sequence or the song (whichever is selected) playing from the beginning.

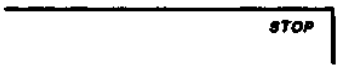
- Pressing *Stop•Continue* will stop the sequencer (if pressed while it is running); or will play the current sequence or the song from wherever it was last stopped (if pressed while the sequencer is stopped).
- The Auxiliary Foot Switch will duplicate the behavior of the *Stop•Continue* button.

- Pressing ***Play*** while holding down ***Record*** will start the sequencer recording on the current track from the beginning of the sequence or song.
- Pressing *Stop•Continue* while holding down ***Record*** will start the sequencer recording on the current track from wherever it was last stopped

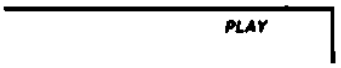
- Pressing ***Record*** while the sequencer is playing will put the sequencer into "Punch in" mode. It will wait for you to start playing before going into Record on the current track,

Sequencer Status

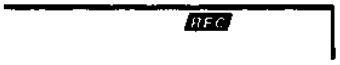
The sequencer is always in one of the following states; the sequencer Status Indicators in the upper-right part of the display always tell you what the current status is:



• STOP — Sequencer at rest



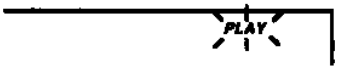
• PLAY — Playing current Sequence or the Song



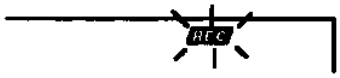
• REC — Recording on current Track, first pass



• ODUB — Overdub: Re-recording current Track



• PLAY (flashing) — Countoff playing prior to going into Play, Record or Overdub



• REC (flashing) — Record Standby: waiting for you to play before going into Record (first Track only)



• ODUB (flashing) — "Punch-in" Standby: waiting for you to play before going into Overdub

Playing Sequences and Songs

Try selecting a sequence, and pressing the *Play* button in the sequencer section, to the right of the display. The selected sequence will begin to play.

While one sequence is playing you can select another one. You will see the name of the new sequence in the display, but the original one will continue to play. When the first sequence is finished, the sequencer will switch to the new sequence, and it will play. In this fashion you can string sequences together in real time, as they play.

Press the *Stop•Continue* button or the Auxiliary Foot Switch to stop the sequence.

Sequencer Tracks

Each sequence is composed of up to eight tracks, which correspond to the eight Instrument•Track locations. That is, each instrument location also doubles as a track. Whatever is recorded on a given track will play on the instrument that is loaded into that Instrument•Track location.

You can only record on one track at a time. All sequence recording is done in EDIT mode, and in EDIT mode you can only select one Instrument•Track at a time (except when RECORD SOURCE=MULTI, see discussion later this section).

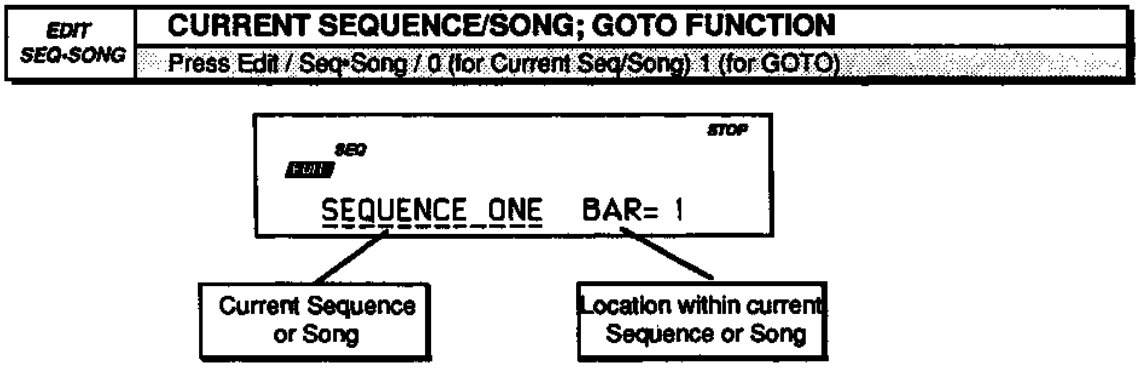
You "mix down" sequences on the EDIT/Track page. From the two screens on this page you can play, mute, or solo each track; you can also adjust the mix level and the pan setting of each track. (Mix and pan for each track are remembered when you save a bank.)

Creating a New Sequence

- Press *Command*, then double-click the *Seq•Song* button. The display shows CREATE NEW SEQUENCE.
- Press *Enter*. The display will show NEW NAME= SEQUENCE 02 (or 03, 04, etc.). There is a cursor beneath the first character. You can now give the sequence a name of your choosing, or use the default name by skipping the next step.
- Name the new sequence, using the *Data Entry Slider* or the *Up/Down Arrow* buttons to change the character, and then pressing the *Left/Right Arrow* buttons to move the cursor to the next character. Continue this until the display shows the name you want.
- Press *Enter*.
- Select the time signature for the new sequence (or, if the time signature that's showing is the one you want, just press *Enter* twice). The time signature for the sequence is set at this time and cannot be changed later. Adjust the top half of the fraction, then scroll right to select the bottom half of the fraction and adjust that
- Press *Enter*. The new sequence is created and becomes the currently selected sequence.

The EDIT/Seq•Song Page

This page acts as the main "control panel" for sequencing.



This screen is where you select a sequence or the song. With the selected sequence or song underlined (as shown above), use the *Up/Down Arrow* buttons or the *Data Entry Slider* to select a different sequence or song. You can always get back to this screen by double-clicking the *Seq•Song* button (when in EDIT mode).

The GOTO Function

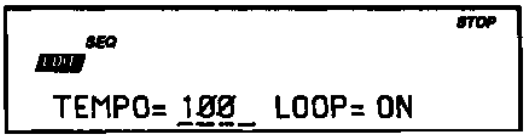
- Press the *Right Arrow* button to move the cursor to the BAR parameter. The display reads as follows:



This shows the current location in the selected sequence or song. When the cursor is under the Bar (or Step) Number you can GOTO any location by moving the *Data Entry Slider* to select a new location, then pressing *Enter*. Pressing *Play* will *always* start the sequencer from the beginning of the selected sequence. Pressing the *Stop•Continue* button will begin playing the sequence from the selected bar.

EDIT SEQ-SONG **TEMPO; LOOP**

Press Edit / Seq•Song / 2 (for Tempo) 3 (for Loop)



Here you can adjust the tempo of the sequence in beats per minute, and the LOOP parameter. When LOOP=ON the sequence will repeat continuously, when LOOP=OFF the sequence will play once and stop.

EDIT SEQ-SONG **CLOCK SOURCE**

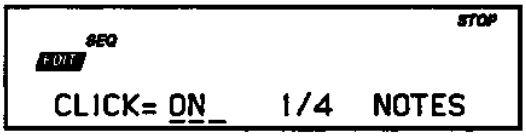
Press Edit / Seq•Song / 4

This parameter determines the Clock Source. There are two possible choices:

- INTERNAL — The EPS-16 PLUS will use its own internal clock.
- MIDI — The EPS-16 PLUS will sync to incoming MIDI clocks from a remote device. This is useful when syncing to a drum machine, but recording on the EPS-16 PLUS.

EDIT SEQ-SONG **CLICK**

Press Edit / Seq•Song / 5



These two parameters control the setting of the CLICK track and the interval at which the click will play.

- REC — the click will be heard only when the sequencer is recording, not playing. This is the default.
- OFF — the click will not be heard during Play or Record.
- ON — the click will be heard whenever the sequencer is running.

EDIT SEQ-SONG **CLICK VOLUME**

Press Edit / Seq•Song / 6

The volume of the click track is adjustable from 00 to 99.



Use the *Data Entry Slider* or the *Up/Down Arrow* buttons to pan the click track within the stereo spread (-99 to +99) of the main outputs, or send it to one of the pairs of auxiliary outputs. The panning and output of the click is handled in the same manner as voice panning and output See *Section* 7 — *Voice Parameters* for more details.



- SEQ COUNTOFF=OFF, the song or sequence will start playing or recording as soon as you press *Play* or *Record/Play*.
- SEQ COUNTOFF=ON, you will hear one bar of click track before the sequencer goes into Play or Record.
- SEQ COUNTOFF=RECORD, you will hear one bar of click track before the sequencer goes into Record, but not prior to going into Play.
- SEQ COUNTOFF=QUIET, there is a *silent* one-bar count before the sequencer starts.



The RECORD MODE parameter determines how data will be recorded by the EPS-16 PLUS sequencer when you enter Record. Use the *Data Entry Slider* or the *Up/Down Arrow* buttons to choose between the following options:

- RECORD MODE=REPLACE — Anything recorded into an existing track will replace data that was in the track previously. The sequencer will stop recording after one time through the sequence or song and will enter Audition/Play mode.
- RECORD MODE=ADD — New data recorded into an existing track will be added to (or merged with) data already in the track — the existing data will be left intact. Again, the sequencer will exit Record after one time through the sequence or song and enter Audition/Play.
- RECORD MODE=LOOPED — As with ADD mode, new data recorded into an existing track will be added to (or merged with) data already in the track. However, when RECORD MODE=LOOPED, the sequencer will remain in Record for as many times as you play the song or sequence through (rather than dropping out of Record after one time through). Think of this as "Drum Machine mode" — as long as the sequence or song keeps playing you can keep adding parts each time around.

- Pressing the *Right Arrow* button again takes you back to the first screen we saw, showing the current sequence (or song) and location.

EDIT SEQ-SONG	**RECORD SOURCE**
	Press Edit / Seq-Song / scroll using the arrow buttons

This parameter determines what will be recorded when the MIDI IN mode is MULTI on the EDIT/System•MIDI page — data from the keyboard, from incoming MIDI, or both. Setting this parameter to MIDI is useful if you want to send data from the EPS-16 PLUS to a MIDI processor, then record only the incoming data coming back from the processor. This parameter only has an effect in MULTI mode; in POLY or OMNI modes the sequencer always records both.

- BOTH — The sequencer will record data received either from the keyboard or from MIDI on the track's MIDI channel.
- KYBD — The sequencer will record data only from the keyboard.
- MIDI — The sequencer will record only data received from the MIDI on the track's MIDI channel.
- MULTI — this setting allows you to record data onto multiple EPS-16 PLUS tracks simultaneously. This is most useful for recording tracks sent from external sequencers or played from guitar controllers.

Note: The EPS-16 PLUS must be set to receive data from MIDI in MULTI mode (MIDI IN MODE=MULTI on the EDIT/System•MIDI page) in order for this feature to work correctly.

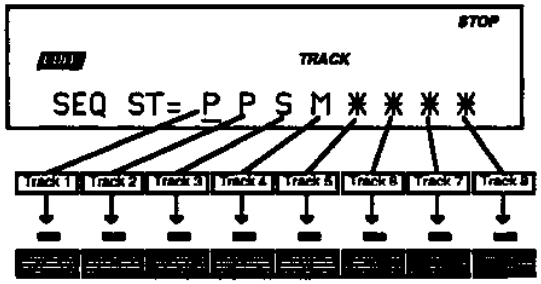
EDIT/Track Page

These parameters control the track functions used when sequencing.



The track status parameter allows you to control the playback status of each track within the selected song or sequence. The Cursor (underline) tells you which track is selected. To select a different track, press its *Instrument•Track* button. The underline will move to the new track.

You can select any of the tracks which contain recorded data and use the *Up/Down Arrow* buttons to select PLAY, SOLO, or MUTE status for each.



The display shows the status of each track:

- "P" means PLAY - Tracks which show a "P" will play normally.
- "S" means SOLO - Selecting "S" for any Track will "solo" the track muting all the others.
- "M" means MUTE - Selecting "M" for a track will silence that track.
- A "Star" indicates that nothing has yet been recorded on the track - no track data. In the illustration, Tracks 5,6,7, and 8 have not yet been recorded.

When the song is selected, if you go to the EDIT/Track page you will find a third screen has been added — it looks just like the track status screen for a sequence except it says SNG instead of SEQ in the left corner of the display. This shows you the status of the song tracks. You can select P (play), M (mute), or S (solo) for any of the song tracks just as would sequence tracks. Note, however, that changing the mix or pan of a song track will also affect any corresponding sequence tracks.

EDIT TRACK	**TRACK MIX; TRACK PAN**
	Press Edit / Track / 1 (for Mix) 2 (for Pan)

Track Mix

The EPS-16 PLUS stores track mix information for each track of a sequence. When you record a sequence track, the track mix will be recorded into the track. When you play a sequence back, each track will have the correct volume balance.

After you've created a sequence, if you want to change the mix volume in a given track:

- Go to the EDIT/Seq•Song page and set RECORD MODE to ADD.
- Go to the EDIT/Track page and set the track mix to the desired starting value. I may help to play the sequence and adjust the mix while listening to the track until you find the proper level.
- While holding down *Record,* press *Play.* After the first bar of the sequence, press *Stop•Continue.*
- Select KEEP=NEW. You have now recorded a new mix volume in that track. You can't audition the volume change on the KEEP=OLD/NEW page. However, you will hear the volume change after you've chosen KEEP=NEW. If you don't like the mix after you've chosen KEEP=NEW, simply repeat the above procedure and set a new volume level.
- It's a good idea to return to the EDIT/Seq•Song page to set the RECORD MODE back to REPLACE for later sequencing.

Mixdown

If you record a song track on an instrument that has sequence tracks defined, the track mix information in the song track overrides the sequence information. In addition, when you are recording a song track, any changes that you make to the track mix during recording will be recorded in the song track. This allows you to create fade in/out assignments while the sequence is in progress.

Track Pan

This parameter allows you to give a track in a sequence or song have specific panning information, overriding pan information from the instrument

Range: -98 (Full Left) to +99; WS (Wavesample — when this is selected, the track will use the panning information that is contained within the instrument).

EDIT TRACK	**TRACK OUTPUT**
	Press Edit / Track / 4

This parameter allows you to override output information from the instrument and send a track in a sequence or song to a specific output. See the description of the Voice Out parameter in *Section 7 — Voice Parameters* for a complete description of the EPS-16 PLUS' output routing scheme.

EDIT TRACK

EFFECT CONTROL

Press Edit / Track / 5

Because of the dynamic nature of the EPS-16 PLUS' signal processor, instruments can interact and control certain parameters of the selected effect But what happens when you are using a BANK or ROM effect, one that is accessed globally by all the instruments in memory? Without a way to determine which of the instruments will have control of the effect, controllers from all of the instruments would send confusing commands to the signal processor.

This parameter is specifically designed to be used when a sequence or song is using a BANK or ROM effect, and acts as a "traffic cop" for the instruments controllers.

- ON — The instrument will have access to the effect via its controllers. Any parameters within the effect that respond to controllers will take their cues from this instrument.
- OFF — Controller information generated by the instrument will be ignored by the signal processor.

Obviously, since this parameter is designed to let one instrument control the effect, you will want to set one instrument to ON, and all others to OFF.

EDIT TRACK

MULTI-IN MIDI CHANNEL

Press Edit / Track / 6

Determines which MIDI channel the selected instrument will receive on if the MIDI IN MODE=MULTl on the EDIT/System•MIDI page. Remember, the MIDI STATUS parameter would have to be set to LOCAL, BOTH, or MIDI to receive incoming MIDI data.

This parameter has no bearing on which channel the instrument•track will send on (that is determined by the MIDI OUT CHANNEL parameter on the EDIT/Instrument page).

The MULTI IN MIDI CHANNEL set-up for all eight instrument•tracks is saved with the global parameters. Therefore, it is a good idea to use the SAVE GLOBAL PARAMETERS command to put the MULTI IN MIDI CHANNEL set-up onto the disk containing your O.S., or the specific bank, song, or sequence to which the set-up is related. You can then use the LOAD GLOBAL PARAMETERS command to reload the set-up.

Recording a Sequence

Here we will describe recording a new sequence from scratch. First we will concentrate on sequencing with the EPS-16 PLUS alone, and then cover recording MIDI instruments.

1) Create a New Sequence:

- Following the steps outlined earlier in this section, create a new sequence.

2) Record the First Track:

- Select any loaded instrument by pressing its *Instrument•Track* button. This makes it the current track.
- While holding down *Record*, press *Play*. The EPS-16 PLUS immediately puts you on the EDIT/Seq•Song page (described earlier) and the click track starts playing (assuming CLICK=ON or REC on the EDIT/Seq•Song page), giving the tempo. The first beat of each measure is emphasized.
- Adjust the tempo. Press the *Right Arrow* button twice to scroll to the TEMPO parameter. Adjust it to the tempo you want with the *Data Entry Slider*.
- Play the MIDI keyboard connected to the EPS-16 PLUS to commence recording. The bar in which you start playing becomes bar 1 of the sequence.
- Press *Stop* to end recording. The display will say XXX BARS - KEEP TRACK? The length (in bars) of the first track determines the length of the sequence.
- Press *Enter•Yes* to keep the track, defining the length of the sequence, or
- Press *Cancel•No* to erase the first track and start over again.

3) Record Additional Tracks:

- Select a different track. Again, selecting any loaded instrument by pressing its *Instrument•Track* button makes it the current track. Or you can leave the
- original Instrument•Track selected and overdub (re-record) that track.
- While holding down *Record*, press *Play*. After a one bar countoff (if COUNTOFF=CLICK on the EDIT/Seq•Song page) the EPS-16 PLUS goes into record and will record what you play on the selected track.
- Press *Stop*. The display shows:



This is called the PLAY/KEEP page. When NEW is underlined, pressing *Play* will play the new track, and pressing *Enter* will keep it, erasing the original. When OLD is underlined, pressing *Play* will play the ORIGINAL track, and pressing *Enter* will keep it.

While playing the sequence, press the *Left/Right Arrow* buttons to move the cursor between OLD and NEW to hear the original track or the new track.

- With NEW underlined, press *Enter•Yes* to KEEP the new track, or press *Cancel•No* to keep the original. Note that on this page, pressing *Cancel•No* will *always* keep the original track.

"Punching In" on a Track

Suppose you have a track which is fine for the first four bars but the next four bars need to be redone. You can "Punch In" at any point in the track by doing the following:

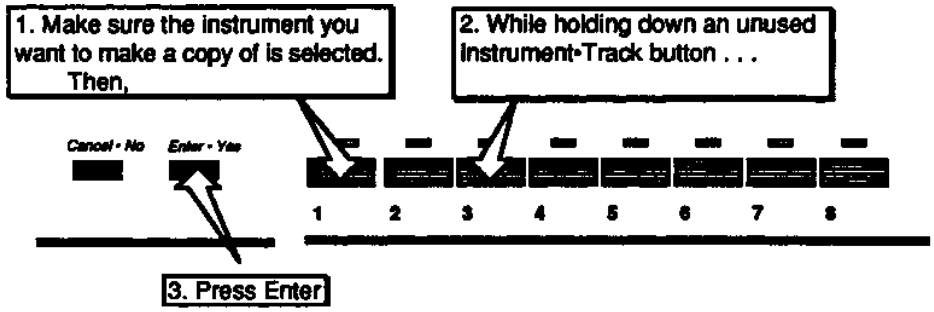
- Select the track you want to record on.
- Press *Play* to start the sequence or song playing.
- Press *Record*. This puts the EPS-16 PLUS in Overdub Standby — the ODUB indicator flashes on the display and the sequencer is waiting to receive key information before going into record.
- Start playing at the point where you want to punch in. As soon as you play anything the EPS-16 PLUS goes into Overdub (or Record for a new track) and records what you play, leaving intact the part of the track before the punch in.
- Press *Stop*. You will see the PLAY/KEEP page as shown above, letting you audition the new or the old track before deciding which to keep.

Recording Another Track with a Copy of the Same Instrument

You will sometimes find that you want to record a second track using the same instrument. There is a quick way to make a "working copy" of any EPS-16 PLUS instrument in an unused location without copying the sample data (thus conserving memory).

Suppose, for example, that you have recorded a track with a piano sound on Track 1. Now you want to record another track with the same sound, but with independent controllers, Mix level, Pan, etc. You can copy the Piano into any empty Instrument•Track location (let's say Track 3) with these three steps:

To Copy **an Instrument to Another Location:**



The display will read PIANO COPIED. Instrument•Track location #3 now contains a copy of the piano in location #1. You can now record on this track just as you would any other. Keys, controllers, etc. recorded on the new track will be independent from any recorded on Track #1. You can Solo, Mute, Mix and Pan the new track independently from the original. The two tracks simply "point to" the same sound. You can make as many copies of an instrument as you want. They will not take up much additional memory, because they are only "pointers" to the original sound.

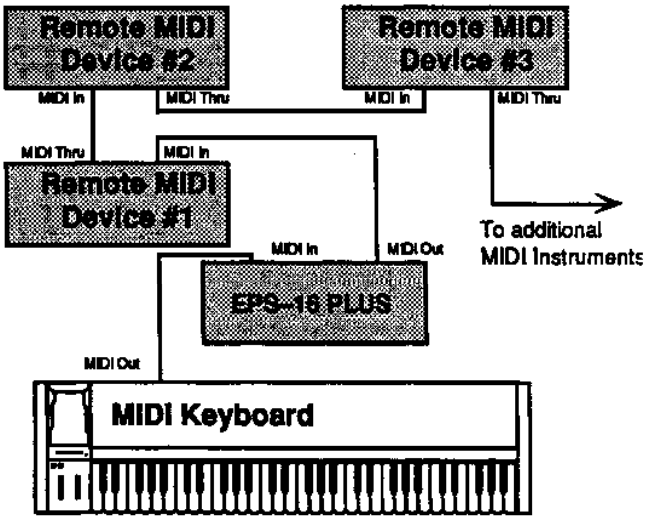
Additional Notes

- When you select an Instrument•Track location which contains a copy, it looks just like the original — the name and all its instrument parameters will be the same. In LOAD mode you can adjust the volume of a copied instrument, select, de-select and stack it as you would any instrument.
- These copied instruments are temporary things — the song or sequence doesn't know that it's playing a copy (in fact the song or sequence never knows what instruments are loaded into which locations). Any copied instruments will be forgotten when the EPS-16 PLUS is turned off unless you save the contents of memory as a bank (using the SAVE BANK command on the COMMAND/Instrument page). When you load a bank, the EPS-16 PLUS recreates any copied instruments which were there when the bank was saved.
- You can not edit the instrument, layer, or Wavesample parameters of the copy independently. Any parameter changes made to the copy will affect the original, and vice-versa.
- If you load a new instrument into the Instrument•Track location which contains the original instrument, any copies of that instrument will automatically be deleted from memory.

MIDI Sequencing on the EPS-16 PLUS — MIDI Connections

You can sequence any remote device exactly as you would a local EPS-16 PLUS instrument:

- On the EDIT/MIDI page, set MIDI IN MODE = POLY, and make sure the TRANSMIT ON = parameter is set to INST CHAN.
- Create a MIDI instrument as shown in *Section 3 — Instruments and Banks*, and assign the MIDI instrument to send on the MIDI channel of the remote device you want to sequence from this track.
- Now select the MIDI instrument and proceed with recording the track just as you would any other track. All keys, controllers and program changes you
- record will be sent out MIDI to the remote device. You can mix, mute, and solo these MIDI Tracks on the EDIT/Track page.



When sequencing multiple MIDI devices, first connect the various destination instruments to the EPS-16 PLUS, and to each other, as shown here. Connect the MIDI Out jack of the EPS-16 PLUS to the MIDI In jack of the first instrument Then connect the MIDI Thru jack of the first instrument to the MIDI In jack of the second instrument Connect the MIDI Thru jack of the second instrument to the MIDI In jack of the third instrument And so on, for as many devices as you will be using.

With this arrangement, once you set up the proper MIDI channels, etc., each device will receive and play only the data that is intended for it, and will "pass along" all. other data. Also, each can be played from its own keyboard (as well as from the EPS-16 PLUS') without affecting the others, because MIDI Thru jacks only pass along incoming MIDI data, and do not transmit what is played on the instrument.

This set up is ideal for controlling everything right from the EPS-16 PLUS. Simply by selecting the track which is set to the same MIDI channel as to a particular instrument, you can:

- Play that instrument from the MIDI keyboard connected to the EPS-16 PLUS;
- Record a track that will play back on that instrument when you play the sequence or song; and
- Send the destination device program changes and adjust its volume (assuming the device receives MIDI Volume).

In other words, once you have made the appropriate connections, and set up the MIDI configuration of the tracks and all destination devices, you can use your main keyboard and the EPS-16 PLUS'S front panel to control and record all the instruments in your rig.

MIDI Mode and Channel — Destination Instruments

The next step is to set up each destination instrument to receive only the MIDI information that is intended for it When each of the receiving units is set to receive on a different MIDI channel (or a number of them, for multi-timbral units) you can control them all right from the EPS-16 PLUS.

For each destination instrument:

- **Set to POLY (OMNI OFF) or MULTI Mode.** Each destination synth must be in a mode where it receives only on its selected MIDI channel (or channels). This is usually referred to as POLY (or OMNI OFF) mode for receiving on a single channel, or MULTI mode for receiving independently on multiple channels. Consult the owner's manual if there is any question about a particular instrument

- **Select a MIDI channel or channels.** The best idea is to assign each destination instrument its own MIDI channel(s) and leave it that way. If you know, for instance, that a certain synth is always set to receive on MIDI channel 4, you can quickly set up a track to drive that synth by simply selecting an undefined track, then assigning that track MIDI Status and MIDI channel 4. Also when each destination instrument is always set to its own distinct MIDI channel, it means that different sequences and songs recorded at different times will always play the right instrument on the right track.

  Once you have assigned MIDI channels to each instrument in your rig, *write them down,* and keep the paper handy for quick reference.

Recording MIDI Tracks

Once everything is set up, you can proceed with recording MIDI instruments exactly as you would for instruments with LOCAL or BOTH status that contained sound data. Tracks that are sent out MIDI are treated the same as internal tracks in terms of recording, overdubbing, punching in, editing, etc. Follow the same steps outlined earlier in this section for recording the first track and then for additional tracks.

For each successive track you record, the procedure will follow the same lines:

- Define the MIDI configuration of the track,
- Record the track, and then
- Either keep or reject the new track from the KEEP=OLD/NEW page.

MIDI tracks can be selected and stacked from the *Instrument•Track* buttons, and can be muted or soloed from the EDIT/Track page, the same as any other tracks. Performance/Track parameters such as Volume, Key Zone, and Transpose all apply to MIDI tracks just as with LOCAL tracks.

Most often you will be recording sequences and songs which contain some MIDI tracks and some LOCAL tracks. When this is the case, be sure that you assign LOCAL status (as opposed to BOTH) to the tracks that you want to play only on the EPS-16 PLUS. This will avoid accidentally sending unintended MIDI data to an external instrument

Recording Program Changes

The EPS-16 PLUS allows program changes to be recorded into any track of a sequence at any point within the sequence.

To record a program change onto a track:

- Make sure that RECORD MODE=ADD in the EDIT/Seq•Song page.
- Enter Overdub mode by pressing *Play*, followed by the *Record* button. The "ODUB" indicator light will begin flashing.
- While holding down the appropriate *Instrument•Track* button (the one that corresponds to the track where you wish to record the program change), use the numeric keypad to type in the program number you want to be recorded.
- Release the *Instrument•Track* button at the point within the sequence that the program change should occur. The program change will be recorded on the track *the moment the button is released.*

Song Mode

The EPS-16 PLUS' Song mode allows you to chain individual sequences together to form a song. Since each sequence has a fixed length, tempo, and time signature, you can use the Song mode to create works with tempo and time signature changes. However, Song mode on the EPS-16 PLUS lets you do much more than just play sequences in order.

First, for each step of the song you can selectively mute or transpose any of the tracks in the sequence. And second...

You can record in song mode. An EPS-16 PLUS song offers you another set of tracks, called song tracks, which let you record over the entire length of the song. The information recorded in these song tracks is separate from information in the tracks of the individual sequences which comprise the song. However, each song track *does* "share" an instrument with the same-numbered sequence track. You will find more details about song tracks later. First, here are a few things to know about EPS-16 PLUS song mode:

- There is only one song in the EPS-16 PLUS at a time. Whenever the song is selected, (as opposed to one of the sequences) the SONG indicator lights on the display:



The SONG indicator remains lit as long as the song is selected, no matter what mode the EPS-16 PLUS is in or page it is on. Whenever the SONG indicator is *not* lit, an individual sequence is selected.

- You select the song in the same way that you select sequences, on the EDIT/Seq•Song page (press *Edit*, then double-click on *Seq•Song).*

- Songs are composed of steps. For each step of the song, you define:
  - > Which sequence will play during that step;
  - > The number of repetitions - how many times the sequence will play during the step;
  - > The status (Play, Mute, or Transpose) of each track of the sequence during the step; and
  - > The transpose amount, which determines how far any transposed tracks in that step will be shifted up or down in pitch.

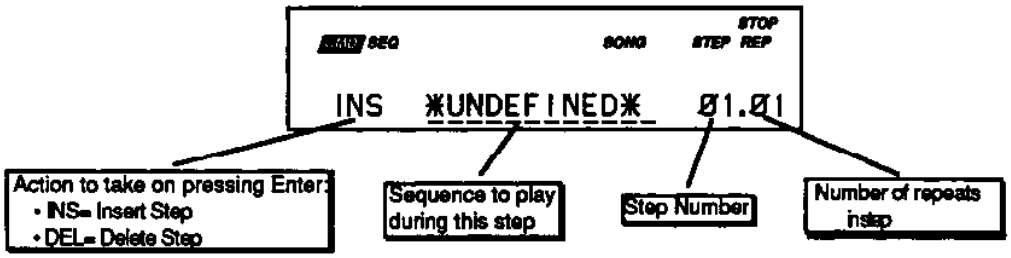
- A song can contain as many as 99 steps, with up to 63 repetitions of each step.

- Putting together an EPS-16 PLUS song will involve the following steps:
  - > Record (or load from disk) the various sequences which you want to combine to form the song.
  - > Construct the song, using the EDIT SONG STEPS command on the COMMAND/Seq•Song page (you will learn how to do that next).
  - > Record any song tracks.
  - > Save the song (along with its component sequences) using the SAVE SONG + ALL SEQS command on the COMMAND/Seq•Song page.
  - > As a final step, it's always a good idea to save the contents of memory as a bank, so that you can later load the song and load all the instruments into the proper locations, just by loading the bank.

Making a Song

Once you have recorded a number of sequences which you want to chain together into a song:

- Press *Command,* then *Seq•Song.*
- Press the *Left/Right Arrow* buttons until the display shows EDIT SONG STEPS.
- Press *Enter.* The following page appears:



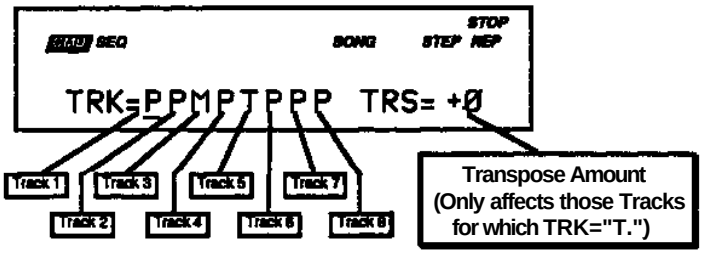
There are four things which can be selected (underlined) on this screen:

- On the left you can choose INS (insert step) or DEL (delete step). This is normally set to INS, for inserting new steps into your song (see the following page for deleting steps).
- In the middle of the screen you choose which sequence will play for this song step. This space currently reads •UNDEFINED•, as shown above, because no steps have yet been defined for the song.
- To the right of the display you see the step number (which in the case of a new song will be step 1) and the number of repetitions (or reps) for that step.

For each song step you want to create:

- Move the cursor (if it's not already there) to underline the sequence name, which currently reads "UNDEFINED•.
- Press the *Up/Down Arrow* buttons to select among the sequences in memory until the display is showing the name of the sequence you want to play during that step.
- Scroll right to move the cursor to the number of repetitions (REP), and adjust the number of times you want the sequence to play during the step. (If you only want the sequence to play once during the song step, leave it set to 01.)

• Press the *Right Arrow* button again to reveal the following display:



Here, for each step of the song, you can select Play, Mute, or Transpose for each track of the sequence.

- "P" means PLAY - tracks that show a "P" will play normally,
- "M" means MUTE - selecting "M" for a track will silence that track during the song step.
- "T" means TRANSPOSE - tracks that show a "T" will be transposed up or down, by the amount shown to the right, for the duration of the step.

If you want to mute or transpose any of the tracks during that step, scroll until that track is underlined, and use the *Up/Down Arrow* buttons to select M (mute) or T (transpose) for that track.

If you have selected T to transpose any of the tracks during the song step, scroll right to underline the Transpose Amount This can be adjusted in one-semitone steps from -12 (down one octave) to +12 (up one octave). This control will only affect tracks for which a T has been chosen at the right Conversely, if you choose T status for one or more tracks but leave the Transpose Amount set at zero, it will have no effect

• Press the *Left* or *Right Arrow* button to return to the first screen shown above.

Once the sequence and number of reps is correct, press *Enter•Yes* to create step one of the song. The display will briefly reads EDITING... then comes back with step two showing:



Now repeat the above procedure to define step two of the song.

For each step, choose a sequence and a number of repetitions and then press *Enter•Yes* to create the step.

• There is always one •UNDEFINED• step *after* the last step in the song.

To Go to a Different Step in the Song:

Move the cursor to underline the step number, and use the *Up/Down Arrow* buttons to go to any step within the song. After you have finished editing the song steps (or at any point during the process, for that matter) you can go back through the song to check that all the steps are right

To Change Anything in an Existing Song Step:

To change any of the variables (sequence to play, number of reps, track mute or transpose) within a song step which has already been created, simply go to that step, as described above, select the thing you want to change and change it You don't have to press *Enter•Yes* to make the changes permanent. You only have to press *Enter•Yes* to actually insert or delete a step.

To Insert a Step Anywhere in the Song:

- Go to the step *before which* you want to insert the step. That is, if you want to insert a step between step two and step three, go to step three.
- Move the cursor to underline the sequence name.
- Use the *Up/Down Arrow* buttons to select the sequence you want to play for the new step.
- Set the number of repetitions and any mute or transpose settings for the step as shown earlier.
- Press *Enter•Yes.* The new step is inserted. If, as in the example above, you go to step three and insert a step, the step you inserted becomes the new step three. What was step three becomes step four, and so on.

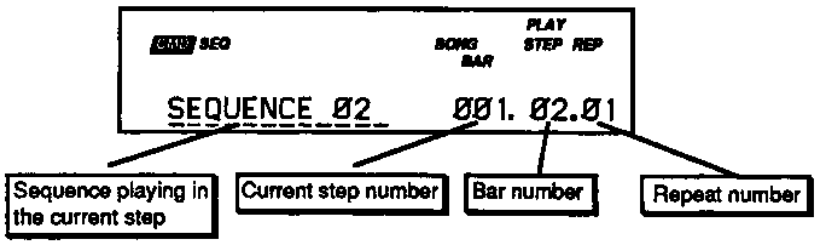
To Delete a Step Anywhere in the Song:

- Go to the step which you want to delete.
- Move the cursor to underline INS at the left of the display.



- Press the *Up Arrow* button to change INS (insert) to DEL (delete).
- Press *Enter•Yes.* The step which was showing is deleted.

When you are through editing the song, press *Cancel•No* to exit song edit. Press *Edit* and then double-click on *Seq•Song* to go the Sequence/Song Select page. You will see that the song is selected. Press *Play* to play the song. When playing back a song from this page, the display shows:



Song Tracks

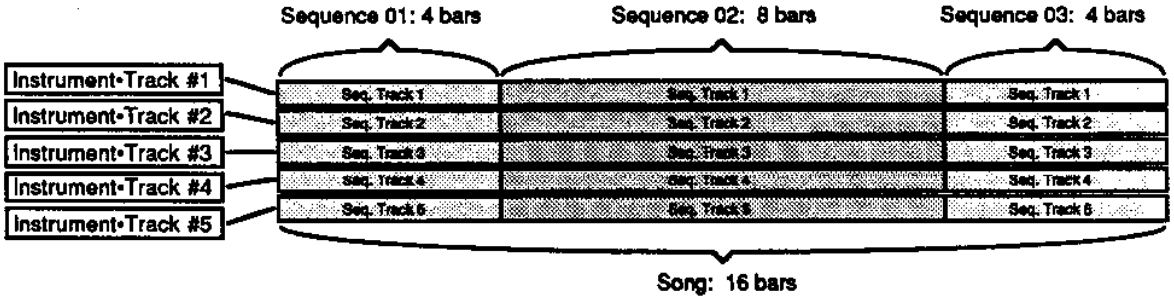
A song on the EPS-16 PLUS is much more than simply a group of sequences chained together. Once you have created a song and edited its steps, you can record another complete set of eight song-length tracks. The length of the song tracks is determined by the combined length of the song's component sequences.

Recording Song Tracks

Let's suppose you have constructed a song. For our example we will take a simple case:

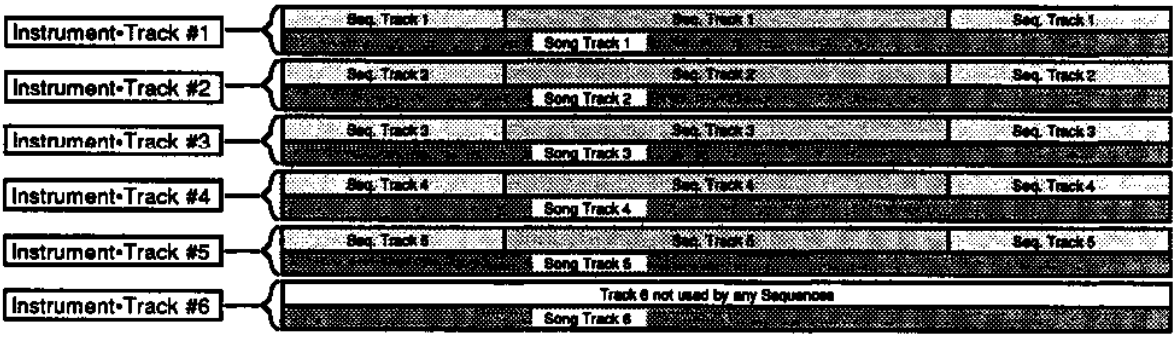
- You have recorded three sequences, each using five tracks, and combined them into a song.
- Step one of the song is Sequence 01 (a 4-bar sequence) for 1 repetition;
- Step two is Sequence 02 (an 8-bar sequence) for 1 repetition; and
- Step three is Sequence 03 (a 4-bar sequence) for 1 repetition.

Your song would look like this:



Now, with the song selected, you can enter Record (by holding down *Record* and pressing *Play)* and record a new song-length track on any of the five tracks. Follow the same procedures for recording song tracks that you would for sequence tracks. The only difference is that a song track is associated with the song itself and not with the individual sequences that comprise the song.

Continuing with the above example, the song tracks might look like this:



Any notes and controllers recorded in a song track will play the instrument loaded into that location — song tracks "share" the eight Instrument•Track locations with the corresponding sequence tracks. Therefore they are not entirely independent For example pitch bends, sustain pedal, pressure, and any other controllers recorded into a song track will also affect notes recorded on the corresponding sequence tracks.

For this reason it is often a good idea to record a song track in a location not used by any sequences, as with track six in the illustration above. You could load a piano sound into Instrument•Track #6 and record a song track with that sound which would remain completely independent of any tracks in the individual sequences. Or, make a copy of an instrument into an unused location and record a song track using the copy.

- When the song is selected, if you go to the EDIT/Track page you will find a third screen has been added — it looks just like the track status screen for a sequence except it says SNG instead of SEQ in the left corner of the display. This shows you the status of the song tracks. You can select P (play), M (mute), or S (solo) for any of the song tracks just as would sequence tracks. Note, however, that changing the mix or pan of a song track will also affect any corresponding sequence tracks.

Note: Any recording or track editing performed while in song mode will affect the song tracks, not the tracks of the individual sequences. In order to do any track editing (or additional recording) within the individual sequences of a song, you must first select that sequence from the EDIT/Seq•Song page.

Section 9 — Sequencer Edit Functions

The following parameters control the editing functions of the sequencer. Commands for creating and manipulating sequences, songs, and the tracks contained within are covered here.

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COMMAND/Seq•Song Page



Use this command to create a new sequence. See *Section 8 — Sequencer Basics* for information on recording a sequence.



This command allows you to copy an entire sequence, including all tracks and parameters in the sequence. COPY SEQUENCE lets you perform commands and edits on the "copy" while preserving the source sequence.

- Select COPY SEQUENCE.
- Press *Enter•Yes.* The display reads FROM SEQ=SEQUENCE ##. Choose your source sequence.
- Press *Enter•Yes.* The display reads NEW NAME=SEQUENCE ##. You can use the data entry controls to change the name of the sequence, or use the default designation.
- Press *Enter•Yes* to complete the command.



Use this command to erase unwanted sequences.

- Select DELETE SEQUENCE.
- Press *Enter•Yes.* The display reads SEQ=SEQUENCE ##.
- If this is the sequence you want to delete, press *Enter•Yes.*



Use this command to save the current sequence to disk.

- Make sure the sequence you want to save is selected.
- Select SAVE CURRENT SEQUENCE.
- Press *Enter•Yes.* The display reads NEW NAME=SEQUENCE ##. If you want to rename your sequence, do so at this time using the data entry commands.
- Press *Enter•Yes.* The display reads SAVING SEQUENCE ##, then DISK COMMAND COMPLETED.



Use this command to save all sequencer memory to disk as a file.

- Select SAVE SONG + ALL SEQS.
- Press *Enter•Yes.* The display reads NEW NAME=••SONG••. You can change the song name at this point
- Press *Enter•Yes.* The display reads SAVING-••SONG•• then DISK COMMAND COMPLETED.



Use this command to rename the current sequence or song.

- Make sure the song or the sequence you want to rename, is selected.
- Select RENAME SONG/SEQUENCE.
- Press *Enter•Yes.* The display reads NEW NAME=SEQUENCE ##. Use the data entry controls buttons to rename the current sequence.
- Press *Enter•Yes* to complete the command.



You can use this command to find out the length of the sequence (in bars), the time signature, the size of all sequencer data, and the size of the current sequence. .. In addition, you can keep track of the duration of the current sequence in minutes, seconds, and fractions of a second. If a song is currently selected, an additional parameter will be displayed which is MIDI SONG SELECT=##. The song can be assigned a MIDI number from 0 through 127. MIDI numbers 1 through 127 are transmitted over MIDI and are stored with the song when you save the song to disk. When MIDI SONG SELECT=0, the parameter is effectively turned off.

Note: This page is mainly for information *only*. You cannot change any of the parameters except for MIDI SONG SELECT from this page.



Using this command clears all the sequencer memory. Save to disk all sequences that are important to you before performing this command.

- Select ERASE SONG + ALL SEQS.
- Press *Enter•Yes.* The display reads ERASE ALL SEQ DATA?
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

CMD SEQ-SONG	**APPEND SEQUENCE**
	Press Command / Seq•Song / 8

This command allows a sequence to be attached (appended) to the end of another sequence. You also can append a sequence to itself to make a longer sequence. For example, if you have a drum sequence that is four bars long, you could append it to itself to create an eight-bar sequence. Do it again and you have a sixteen bar sequence. The sequence to be appended must have the same time signature as the selected sequence.

- Select APPEND SEQUENCE.
- Press *Enter•Yes.* The display reads FROM SEQ=SEQUENCE ##. This is the source sequence.
- Press *Enter•Yes.* The display reads TO SEQ=SEQUENCE ##. This is the destination sequence.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

CMD SEQ-SONG	**CHANGE SEQUENCE LENGTH**
	Press Command / Seq•Song / 9

Use this command to add bars to or delete bars from a sequence.

- Select CHANGE SEQUENCE LENGTH.
- Press *Enter•Yes.* The display reads ADD ## BARS AT ##.
  If, for example, you wanted to add 2 bars to your sequence starting at bar 4, adjust the display to look like this: ADD 2 BARS AT 4.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).
- Or, you can underline ADD in the display and use the *Up Arrow* button to change it to DELETE You can now delete specific bars from the sequence using the above procedure.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

CMD SEQ-SONG	**SELECT LOADABLE INST**
	Press Command / Seq•Song / scroll using the arrow buttons

This parameter is used when an EPS-16 PLUS song or sequence will be issuing program changes to load instruments from floppy disk or hard drive. Because of the dynamic way in which the EPS-16 PLUS allocates its internal memory, loading in new instruments while the sequencer is running could pose problems in "memory shuffling." What SELECT LOADABLE INST does is allow you to specify which instruments within the selected song or sequence will be having instruments loaded into it The EPS-16 PLUS can then shuffle the memory currently being used to make room for a smooth instrument load.

- Select SELECT LOADABLE INST.
- Press *Enter•Yes.* You will see the following display:



- Now, use the *Left/Right Arrow* buttons to scroll through the tracks (indicated by the dashes) and the *Up/Down Arrow* buttons to enable and disable the tracks for instrument loading (numbers indicate that the track is enabled).

You can use the event editor to insert Load File events into the track and the EPS-16 PLUS will manage its memory accordingly. Of course, there still must be enough memory in the EPS-16 PLUS to hold the instruments and sequencer data.

CMD SEQ-SONG	**EDIT SONG STEPS**
	Press Command / Seq•Song / scroll using the arrow buttons

See *Section 8 — Sequencer Basics* for a description of EDIT SONG STEPS.

COMMAND/Track Page

These commands allow you to manipulate data on the individual tracks.



This command automatically corrects the timing of a track. After you have recorded a track, the EPS-16 Plus can post-quantize the track and move the notes to the nearest beat boundary. For example, if you set quantize to 1/4, all the notes will be adjusted to the nearest quarter note. You can compare the quantized track with the original track on the KEEP=OLD/NEW page, before deciding whether to keep the results.

- Select QUANTIZE TRACK.
- Press *Enter•Yes.* The display reads TRACK=##. Select the track you want to quantize by pressing one of the active *Instrument•Track* buttons.
- Press *Enter•Yes.* The display reads QUANTIZE TO ##. The quantize values are: 1/4, 1/4T (triplets), 1/8, 1/8T, 1/16, 1/16T, 1/32, 1/32T, 1/64, 1/64T. Select a quantize value.
- Press *Enter•Yes.* The display reads ENTIRE TRACK. Pressing *Enter•Yes* at this point will edit the entire track and place you on the KEEP=OLD/NEW page. If you wish to edit only a portion of the track, press the *Up Arrow* button until the display reads SET RANGES. You can then press *Enter•Yes* and set both the key range and bar/beat range in which the editing will take place. Upon completion of setting these ranges, the editing will take place and you will be placed on the KEEP=OLD/NEW page. If you've previously set editing ranges for the current song or sequence, you can use the *Up Arrow* button to call up USE RANGES. Pressing *Enter•Yes* will commence editing based on the previously set range values.
- Press *Enter•Yes* if you want to keep the quantized version of the track, or *Cancel•No* to keep the unquantized track.

CMD TRACK **COPY TRACK**

Press Command / Track / 1

This command copies any bar range of a track onto another track.

- Select COPY TRACK.
- Press *Enter•Yes.* The display reads FROM SEQ=SEQUENCE ##. Use the *Up/Down Arrow* buttons to select a source sequence.
- Press *Enter•Yes,* or scroll right to select FROM TRACK=##. Select the source track by pressing one of the active *Instrument•Track* buttons. In this command the source track is the current track.
- Scroll right to select BAR ## THRU BAR ##. Choose a bar range here.
- Scroll right to TO SEQ=SEQUENGE ##. This is the destination sequence. It is not selectable because the destination sequence, in this case, is the current sequence. If you wish to copy a track from one sequence to another, use the FROM SEQ parameter to select a different source sequence.
- Scroll right to select TO TRACK=##. Choose a destination track by pressing one of the active *Instrument•Track* buttons.
- Scroll right to select AT BAR=##.
- Press *Enter•Yes.* The display reads KEEP=OLD/NEW.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

CMD TRACK **ERASE/UNDEFINE TRACK**

Press Command / Track / 2

Use this command to erase a selected track. Keep in mind, even if you delete an instrument from an Instrument•Track location, track data is still there until you undefine it You can determine whether a track is defined by pressing *Edit,* then *Track.* Scroll to the Track Status parameter. An asterisk indicates that a track is undefined.

- Select ERASE/UNDEFINE TRACK.
- Press *Enter•Yes.* The display reads TRACK=##. Select the track you want to erase by pressing one of the active *Instrument•Track* buttons.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

CMD TRACK **FILTER EVENT**
Press Command / Track / 3

This command provides a convenient way to eliminate or copy specific information in a track, while leaving other track data intact.

- Select FILTER EVENT.
- Press *Enter•Yes.* The display reads TRACK=##. Select the track you want to edit by pressing one of the active *Instrument•Track* buttons.
- Press *Enter•Yes.* The screen displays the following:



On this screen, you select the type of event to be "filtered" or edited.

The following event types are available for editing in this parameter:

- CNTL-1.MODWHL —Mod Wheel
- CNTL-4.PEDAL — Control Voltage
- CNTL-7.VOLUME — Volume
- CNTL-64.SUSTN — Sustain
- CNTL-70.PSEL — Patch Select
- CNTL-XX. XCTRL — External Cnt
- ALL CONTROLLERS
- CHAN-PRESSURE — Channel Press
- MIXDWN VOLUME — Track Vol
- MIXDOWN PAN — Track Pan
- PITCH-BEND — Pitch Bend Wheel
- KEY-PRESSURE — Poly-Key Press
- LOADFILE EVNT — Load File Event
- PROGRAM-CHNG — Program Chng
- KEY-EVENTS

- Select the type of event for editing by using the *Up/Down Arrow* buttons, then press *Enter•Yes.* At this point, there are two editing options:

- ERASE — This option will erase all events or a portion of events of the type specified in the previous step. Press *Enter•Yes* and the display will read ENTIRE TRACK. Pressing *Enter•Yes* at this point will erase all of the selected events on the entire track and place you on the KEEP=OLD/NEW page. If you wish to erase only events in a portion of the track only, press the *Up Arrow* button until the display reads SET RANGES. You can then press *Enter•Yes* and set both the key range and bar/beat range in which the editing will take place. Upon completion of setting these ranges, the editing will take place and you will be placed on the KEEP=OLD/NEW page. If you've previously set editing ranges for the current song or sequence, you can use the *Up Arrow* button to call up USE RANGES. Pressing *Enter•Yes* will commence editing based on the previously set range values.

- COPY — This option allows you to copy events to another track. Use the *Instrument•Track* buttons to select the destination track. After selecting the destination track, press *Enter•Yes.* The editing proceeds from this point in the same manner as erasing events.

CMD TRACK	**MERGE TWO TRACKS**
	Press Command / Track / 4

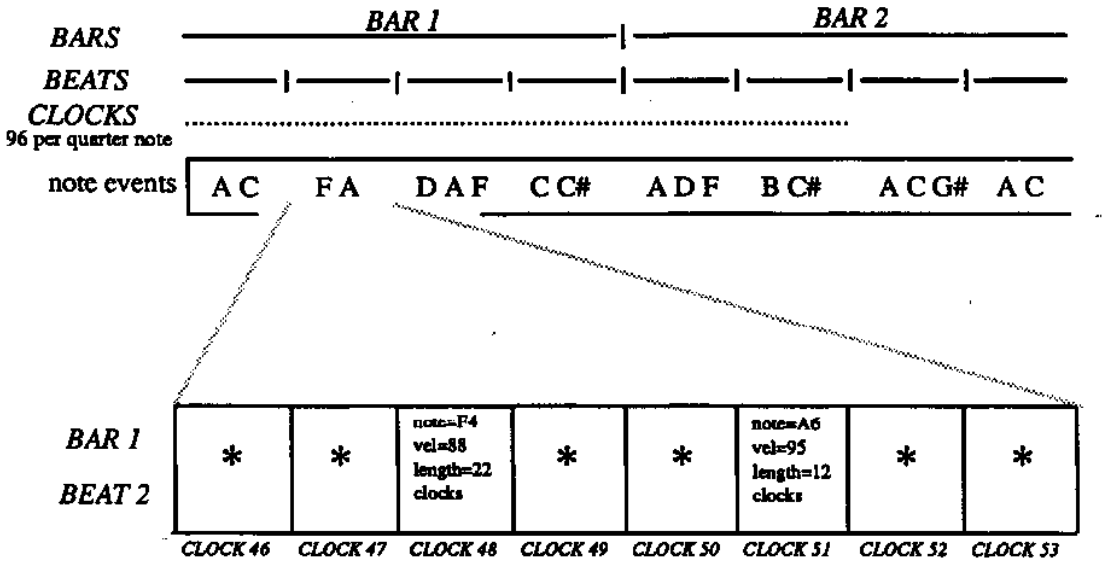
This command merges all key and controller information from one track into another track. This allows you to record several different tracks, all with the same instrument and MIDI configuration, then merge them into one. This is useful for creating sound-on-sound type sequences where you add rather than replace track data.

Note: You may run into problems if you try to merge two tracks with similar controller events. For instance, if you have pitch bend in your source track, and pitch bend in the destination track, and you merge them together at the *same point in the sequence*, it will result in "controller conflict" If this happens to you, erase the controller from one of the tracks, and then merge.

CMD TRACK	EVENT EDIT TRACKS
	Press Command / Track / 5

Use this command to add, delete, lengthen, shorten, change the velocity, or the position of individual notes in a track. EVENT EDIT TRACKS is a very useful command. Here are the fundamentals.

The sequencer uses "bars," "beats," and "clocks" to mark time during the recording of a track. The illustration below represents a stream of events recorded during two bars of a track.



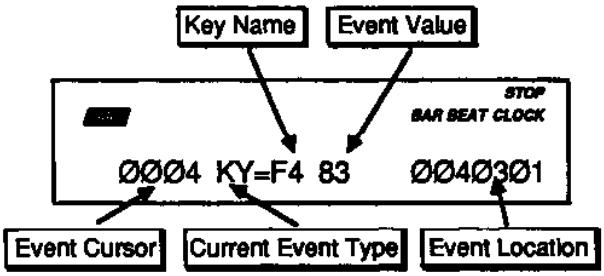
There are always 96 clocks per quarter note. The number of beats in a bar depends upon the time signature of the sequence. The number of bars depends upon the sequence length.

Sequencer tracks are made up of note events that occur at some location in the track. The location is defined in terms of bars, beats, and clocks. Note events consist of key, velocity, and duration information.

In the illustration above, an event occurs at BAR 1, BEAT 2, CLOCK 48. The note event is key F4. It was struck at a velocity of 88 (V=88). Its NOTE LENGTH (duration) is 22 CLOCKS. All this information is displayed for each key event when you use the EVENT EDIT TRACK command. You can change the key, velocity, or length of any key event. You also can delete events and insert new ones.

The EVENT EDIT TRACK function works on an individual track basis.

• With the track you want to edit selected, press the *Command* button, followed by the *Track* button. The display shows:



This is the Event Locating Screen.

Event Cursor

When this field is selected, you can use the *Data Entry Slider* or *Up/Down Arrow* buttons to step ahead or back in time among the events in the track to find the one(s) you want to edit. When you press the *Up/Down Arrow* buttons, it will advance to the next or previous event of the type specified in the Event Type Filter. Moving the *Data Entry Slider* will scroll quickly through all the events in the track. You will hear the notes in the sequence play as you step through the track.

Current Event Type

This displays the current event type being viewed. This parameter is display only and cannot be changed from this screen.

Key Name

This parameter displays the key name that is either being played (when Current Event Type is Key Events "KY") or being affected by pressure (when Current Event Type is Key Pressure "KP").

The Key Name parameter behaves in the same fashion as the Event Cursor would, enabling you to use the data entry controls to scroll to the next or previous event.

To change the Key Name for the current event, select the Key Name parameter and play the new key on the keyboard.

Event Value

This shows the value of the current event. The values can be changed using the *Data Entry Slider* or *Up/Down Arrow* buttons. These changes take place as they are made.

Note: When the current event type is KEY EVNT, the event value refers to the keys velocity value. When adjusting this value, you will notice that the *Up/Down Arrow* buttons change the value by three or four, instead of one. This is due to the velocity response of the EPS-16 PLUS and is perfectly normal.

Event Location

Shows the current location in terms of Bar, Beat, and Clock. These three location fields can be individually selected by repeated presses of the *Left/Right Arrow* buttons. This allows you use the *Up/Down Arrow* buttons to step ahead or back in time by bars, beats or clocks, depending on which field is selected. Note that this parameter does not alter the track data in any way, it merely provides a method for viewing and locating events within a track.

Note: When event editing a song track there will be an additional display which will have two more location values, corresponding to the step and repetition of the song. This screen can be found by pressing the *Right Arrow* button while in song mode.

After familiarizing yourself with the parameters on this screen, press the *Left Arrow* button until you see the following:



Event — Event Type Filter

This controls which types of events will be shown on the Event Locating screen as you scroll up through the events in the track. When set to AL = ALL EVNT, every event in the track will be listed. On the other settings, some types of events will be left out of the list — when the Event Type is changed and you return to the Event Locating screen, the display will jump directly to the next event of the type shown, skipping other types. Event Types which can be selected here are:

MW = MODWHEEL — Mod Wheel
FP = FOOTPEDL — Foot Pedal
VO = VOL PEDL — Volume Pedal
SU = SUSTAIN — Sustain Pedal
PS = PATCH SEL — Patch Select
XC = EXT CONT — External Controller
CO = ALLCONT — All Controllers
CP = CHANPRSR — Channel Pressure
MX = MIX VOL — Mixdown Volume
PN = MIX PAN — Mixdown Pan
PW = PITCHWHL — Pitch Bend Wheel
KP = KEY PRSR — Key Pressure
LO = LOADFILE — Load File Event
PC = PROG CHG — Program Changes
KY = KEYEVNT — All Key Events
AL = ALL EVNT — All notes and controllers

Event Locating Screen for All Events, Key Events and Key Pressure

When event editing Key Events on the Event Locating screen, pressing the *Right Arrow* button once (when in sequence mode) or twice (when in song mode) brings up an additional screen that looks like this:



These two parameters set the duration for a particular note in beats and clocks. This screen only appears when Current Event Type is KEY EVNT.

INSERT and DELETE

After selecting a location with the Event Locating Screen, you can INSERT or REMOVE notes, controllers, or program changes.

- From the Event Locating Screen, press the *Enter•Yes* button. The display reads:



From this screen, you can use the *Left/Right Arrow* buttons to choose between the following:

1) INSERT a note, controller, or program change into the selected track
2) DELETE a note controller, or program change into the selected track

- INSERT — This command is used to insert an event into the selected track. To utilize this function, select the type of command to be inserted with the Event Type Filter. Advance to the Event Locating Screen and select the location where the event is to be placed. On events other than key events, set the desired event value. Finally, use this screen to insert the event. Pressing *Enter•Yes* with INSERT underlined will insert the event.

- DELETE — Removes the event displayed on the Event Locating Screen. As with the INSERT command, select the type of command to be removed with the Event Type Filter. Advance to the Event Locating Screen and select the location where the event that is to be removed is located Finally, use this screen to remove the event Pressing *Enter•Yes* with DELETE underlined will remove the event

Hint: When a key event is deleted, the key number and velocity are remembered. The next time a key event is inserted it will default to the last key event deleted. This provides a convenient way to move a single key event that may be off-time. This is only true for key events.

Auditioning Changes

Once you have completed making changes to the track and would like to hear how they sound, press the *Cancel•No* button. This places you on the KEEP OLD/NEW page. From here, you can decide whether to keep the changes you've made, or go back and try again. If you have not made any changes to the track, pressing *Cancel•No* exits the EVENT EDIT TRACK command.



Use this command to transpose notes in a track by as much as an octave, up or down.

- Select TRANSPOSE TRACK.
- Press *Enter•Yes.* The display reads TRACK=##.
- Select TRANSPOSE AMOUNT=## (Range -12 to +12 semitones).
- Select RANGE. Set the key and bar/beat ranges as described in earlier commands.
- Press *Enter•Yes.* The display reads KEEP=OLD/NEW.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).



Use this command to increase or decrease the effect of a controller in a track.

- Scroll to SCALE EVENT.
- Press *Enter•Yes.* The display reads TRACK=##.
- Scroll to SCALE=_. The controllers on this page include: KEY-VELOCITY, MODWHL, PEDAL, VOLUME, SUST, PSEL, XCTRL, ALL CONTROLLERS, CHAN-PRESSURE, MIXDWN-VOLUME, MIXDOWN-PAN, and PITCH-BEND.
- Scroll to SCALE BY ##. The *Data Entry Slider* scales the controller by whole values; the *Up/Down Arrow* buttons scale it by fractions. Values of less then 1.00 will decrease the effect of a controller. Values greater than 1.00 will increase the effect of a controller in a selected track.
- Scroll to RANGE. Edit as described in previous commands.
- Press *Enter•Yes.* The display reads KEEP=OLD/NEW.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).



This command allows you to shift all note events on a track forward or backward in time. This can be useful for correcting MIDI delay, or creating a "lazy" or "rushed" feel when a track is moved in time relative to other tracks.

- Scroll to SHIFT TRACKS BY CLOCKS.
- Press *Enter•Yes.* The display reads TRACK=##.
- Scroll to SHIFT AMOUNT=## (Range -96 to +96 clocks).
- Press *Enter•Yes.* The display reads KEEP=OLD/NEW.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

Section 10 — Sequencer Applications

This section covers a number of advanced sequencer applications, including using the EPS-16 PLUS with a variety of external MIDI devices.

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MIDI Song Selects 10-1
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Song Position Pointers

The EPS-16 PLUS sends and receives Song Position Pointers via MIDI. Song Position Pointers are MIDI commands that tell a sequencer or drum machine where to locate within a song or sequence.

When the EPS-16 PLUS receives a Song Position Pointer, it will locate to the appropriate place in the selected song or sequence.

The EPS-16 PLUS sends a Song Position Pointer over MIDI whenever you use the Auto-Locate control (the GOTO function on the EDIT/Seq•Song page). Any receiving unit which recognizes Song Position Pointers will locate to the same spot. (Not all devices recognize Song Position Pointers. Consult the manual of any other sequencing device you are using to see if it does.)

MIDI Song Selects

MIDI Song Selects allow a sequencer such as the EPS-16 PLUS to instruct a remote sequencer or drum machine to select a new song whenever you select a song on the EPS-16 PLUS. Whether or not it sends them depends on the setting of the MIDI SONG SELECT parameter on the EDIT/System•MIDI page.

The SEQUENCER INFORMATION parameter on the COMMAND/Seq•Song page allows you to set the MIDI SONG SELECT number that will be sent whenever the song is selected. This information is saved when you save the song.

Using the EPS-16 PLUS with a Drum Machine

When you use the EPS-16 PLUS in conjunction with a drum machine or other rhythm sequencer, there are three ways to have them operate together:

1) Sync the drum machine's clock to the EPS-16 PLUS;
2) Sync the EPS-16 PLUS' clock to the drum machine; or
3) Sequence the drum machine from the EPS-16 PLUS, just as you would a synthesizer.

To Sync a Drum Machine to the EPS-16 PLUS:

- Connect the MIDI Out of the EPS-16 PLUS to the MIDI In of the drum machine.
- Set the drum machine to sync to MIDI clocks.
- Set the drum machine to receive on an unused MIDI Channel, OMNI Off; or disable channel information. You don't want the drum machine playing EPS-16 PLUS sequence data intended for other instruments. MIDI clocks, start, stop, and continue are *real time* commands, and are sent and received regardless of MIDI channel or mode.
- The drum machine should now sync to the EPS-16 PLUS' clock. Pressing *Play* or *Stop•Continue* will start, stop, and continue the drum machine, assuming it receives those commands.

To Sync the EPS-16 PLUS to a Drum Machine:

- Connect the MIDI Out of the drum machine to the MIDI In of the EPS-16 PLUS.
- Set the EPS-16 PLUS to sync to MIDI clocks. On the EDIT/Seq•Song page, select CLOCK SOURCE=MIDI.
- Set the drum machine to not send channel info, or to send on a MIDI Channel that is not being used by any of the EPS-16 PLUS tracks. Again, MIDI clocks, start, stop, and continue are sent and received regardless of MIDI channel or mode.
- The EPS-16 PLUS should now sync to the drum machine's clock. Starting, stopping, or continuing the drum machine will start, stop, and continue the EPS-16 PLUS.

To Sequence a Drum Machine from a Track of the EPS-16 PLUS:

- Connect the MIDI Out of the EPS-16 PLUS to the MIDI In of the drum machine.
- Set the drum machine to Tape Sync or External Clock, or any setting other than Internal or MIDI Clock. This way it will not play its own patterns, but will act only as a sound-producing device, sequenced from a track of the EPS-16 PLUS.
- Set the drum machine to POLY (OMNI Off) mode, and select a MIDI Channel.
- On the EDIT System•MIDI page, set TRANSMIT ON=INST CHAN
- From the EDIT/Instrument page, assign a track on the EPS-16 PLUS MIDI status, and set it to the same MIDI channel you assigned the drum machine.

- You should now be able to play the drum machine from the EPS-16 PLUS sequence information. You can then record a track on the EPS-16 PLUS, from the MIDI keyboard connected to the EPS-16 PLUS, which will play on the drum machine — just as if you were sequencing an external synthesizer. The advantage of this approach is that some drum machines respond better to velocity when played from MIDI than when played from their own front panels. Thus you may get more dynamic range out of your drum machine if you use this approach. The disadvantage is that you use up EPS-16 PLUS sequencer memory to sequence the drum machine.

Using the EPS-16 PLUS with a MIDI Guitar Controller

The EPS-16 PLUS is an ideal voice module to use with any MIDI guitar controller which is capable of sending in MONO mode. MONO mode allows a guitar controller to send the notes played on each string on a different MIDI channel. This has the advantage of letting each string send pitch bends independently, which is the only way to truly recreate guitar technique on a synthesizer.

Some earlier guitar controllers do not support MONO mode. You will have to consult the manual of your particular model to see if it does. If you have a guitar controller which only sends in POLY mode (i.e. send all six strings on the same MIDI channel) you should use the EPS-16 PLUS in POLY mode, or OMNI mode.

For MIDI guitar controllers which do support MONO mode, you will want to put the EPS-16 PLUS in one of the two versions of MONO mode which it implements. In MONO mode (A or B), the EPS-16 PLUS receives on eight consecutive MIDI channels with only one voice assigned to each MIDI channel.

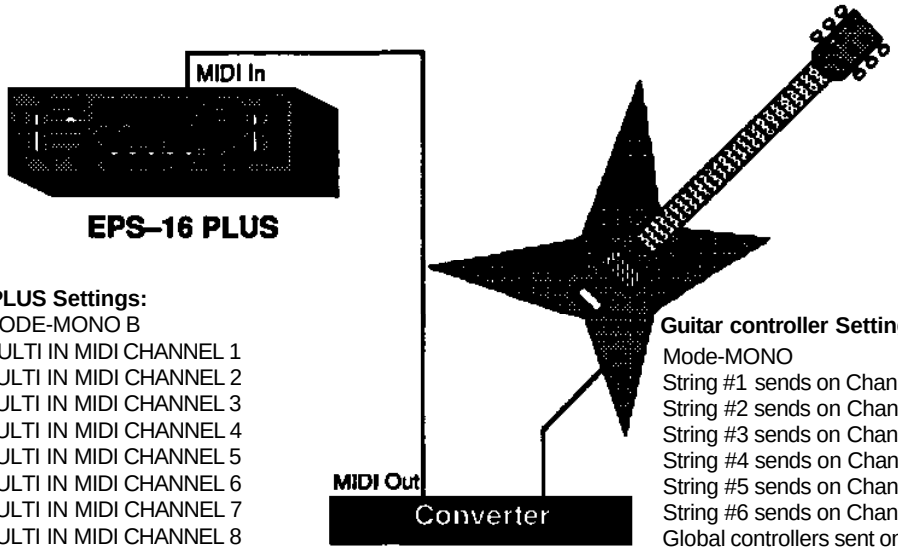
- MONO A is the mode you will probably use most often. This is the mode to use when you want to play the same sound on all the strings of your guitar controller. In MONO A, all eight MIDI channels are routed to play whatever Instrument•Track(s) are selected or stacked on the front panel. In other words, it behaves like POLY or OMNI modes except that it is receiving monophonically on multiple MIDI channels.

- MONO B is the mode to use if you want to be able to play a different sound on each string of your guitar controller. In MONO B, each Instrument•Track receives of a different MIDI channel. It behaves like MULTI mode except that each incoming MIDI channel is assigned only one voice.

To use the EPS-16 PLUS in MONO A mode, set it up as follows:

- Load one or more instruments into the EPS-16 PLUS.
- Press *Edit,* then *System•MIDI.* Scroll to MIDI IN MODE.
- Select MIDI IN MODE=MONO A.
- Press *Edit,* then *Track.* Scroll to MULTI IN MIDI MODE.
- Set each Instrument•Track MULTI IN MIDI CHANNEL to correspond with its track number (Track 1 MULTI IN MIDI CHANNEL=1, Track 2 MULTI IN MIDI CHANNEL=2, etc.).
- Set your guitar controller to send in MONO mode on channels 1- 6 (some models have an easy shortcut for getting into this state).
- Connect the MIDI Out of the guitar controller module to the MIDI In of the EPS-16 PLUS.
- Press *Load* on the EPS-16 PLUS to return to LOAD mode. (Remember—the EPS-16 PLUS will only respond to program changes or select multiple instruments when in LOAD mode.)
- Select an Instrument•Track either by pressing its front panel button or by sending a program change from the guitar controller.
- You should now be able to play the EPS-16 PLUS from the guitar controller with all the strings playing whatever instrument(s) are selected or stacked on the front panel.

To use the EPS-16 PLUS in MONO B mode:
The procedure for using the EPS-16 PLUS in MONO B is essentially the same except that now each MIDI channel plays its corresponding Instrumen•Track as shown below.



EPS-16 PLUS Settings:
MIDI IN MODE-MONO B
Track 1 MULTI IN MIDI CHANNEL 1
Track 2 MULTI IN MIDI CHANNEL 2
Track 3 MULTI IN MIDI CHANNEL 3
Track 4 MULTI IN MIDI CHANNEL 4
Track 5 MULTI IN MIDI CHANNEL 5
Track 6 MULTI IN MIDI CHANNEL 6
Track 7 MULTI IN MIDI CHANNEL 7
Track 8 MULTI IN MIDI CHANNEL 8

Guitar controller Settings:
Mode-MONO
String #1 sends on Channel 1
String #2 sends on Channel 2
String #3 sends on Channel 3
String #4 sends on Channel 4
String #5 sends on Channel 5
String #6 sends on Channel 6
Global controllers sent on Chan. 16

A few important points about MONO B Mode:

- Notes played on each string will play only the corresponding Instrument•Track. Each string/Instrument•Track combination is totally independent.
- MULT! IN MIDI CHANNELS do not have to be set 1-8. They can be set to any channel from 1 to 16, as long as each track has an independent MULTI IN MIDI CHANNEL, and the guitar controller transmits accordingly. Unless you have a very complex MIDI setup, setting things up as shown above will provide the most straight-forward and intuitive arrangement.

Patch Selects and Presets

Making patch select changes from a continuous controller (i.e. mod wheel, whammy bar, etc.) can be an adventure. The patch select buttons are sent and received as MIDI controller #70. Since the EPS-16 PLUS recognizes the 0-31 range as both patch select up; 32-63 as the right patch select down; 64-95 as the left patch select; 96-127 as both patch selects down, it can be difficult to make predictable changes from a continuous controller. If your MIDI module has the capability of sending discrete or specific, rather than continuous controller numbers, then you'll be able to send predictable patch select changes.

Another alternative is to assign the two pedals of the optional S W-5 Dual Foot Switch to act as patch select buttons. That way you can change patches with you feet as you play the guitar controller.

Also, patch select configurations can be stored within performance presets which can be accessed by program changes 17-27 (MONO A only). Each time you send a program change from your MIDI module, the EPS-16 PLUS will respond to that change by selecting one of the eight presets (see *Section 3 — Instruments and Presets)*. Also, check your program change and patch assignment section in you MIDI controller manual.

Recording into the EPS-16 PLUS Sequencer from a MIDI Controller

On many occasions, you may find it convenient to use an external controller to record a track into the EPS-16 PLUS' internal sequencer. This could be for added authenticity (recording from Drum Pads to get a "live drummer" feel), flexibility (recording from an 88-note keyboard controller), or ease of use (you're a guitarist recording from a guitar controller). No matter which type of MIDI controller you use, there are a few parameters that need to be set in order to record into the sequencer.

Recording Into a Single Track (One MIDI Channel)

- Connect a MIDI cable from the MIDI Out of the controller to the MIDI In of the EPS-16 PLUS.
- Set the MIDI IN MODE to POLY on the EDIT/Systerm•MIDI page of the EPS-16 PLUS. The MIDI controller should be in POLY mode as well.
- Set the EPS-16 PLUS MIDI BASE CHANNEL to the same MIDI channel as that which is being transmitted by the MIDI controller.
- Select the track you want to record on by pressing the appropriate *Instrument•Track* button on the EPS-16 PLUS, and make sure its MIDI STATUS is set to BOTH, LOCAL, or MIDI.
- On the EDIT/Seq•Song page, set the RECORD SOURCE parameter to BOTH or MIDI.

Recording proceeds normally from this point

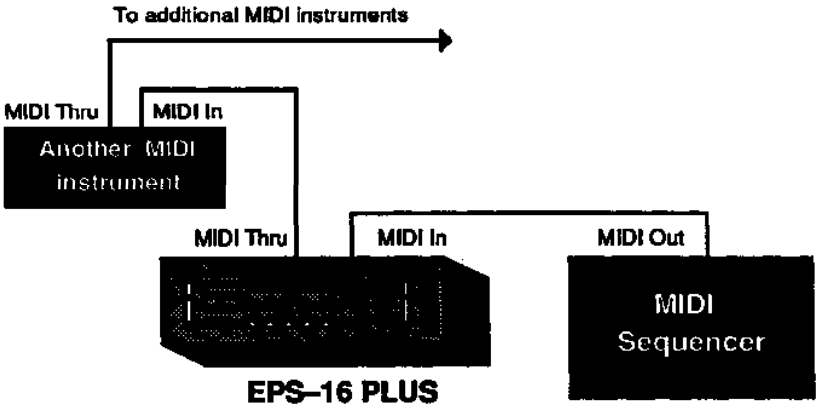
Recording Into Several Tracks (Multiple MIDI Channels)

- Connect a MIDI cable from the MIDI Out of the controller to the MIDI In of the EPS-16 PLUS.
- Set the MIDI IN MODE to MULTI on the EDIT/System•MIDI page of the
- EPS-16 PLUS.
- Set the MIDI controller to either MONO B (for guitar controllers sending on individual strings) or MULTI (for transferring data from another sequencer). Consult the controllers manual for details.
- Set the individual MULTI IN MIDI CHANNEL (found on the EDIT/Track page) for each track, matching MIDI channels with those that will be sent from the controller.
- Make sure all the tracks you want to record on have their MIDI STATUS set to BOTH, LOCAL, or MIDI.
- On the EDIT/Seq•Song page, set the RECORD SOURCE parameter to MULTI.

Once these parameters are set, you can begin recording. For more information on recording in MULTI, see *Section 8—Sequencer Basics.*

Using the EPS-16 PLUS with an External Sequencer

Because of its multi-timbral capabilities, the EPS-16 PLUS is an ideal instrument for use with a MIDI sequencer. Its ability to listen to up to eight MIDI channels at once means that the EPS-16 PLUS can take the place of several instruments in your rig.



The illustration above shows a typical sequencing set-up. Of course the EPS-16 PLUS doesn't have to be the first in the chain after the sequencer — you can chain MIDI instruments in any order, with one exception. If a unit doesn't have a MIDI Thru jack, you must place that unit last in the chain.

POLY Mode — The EPS-16 PLUS as One Instrument

We'll start with the most basic sequencing situation, in which the EPS-16 PLUS will be used as if it were an ordinary instrument. This is how it will act in POLY mode. In POLY mode, the EPS-16 PLUS will respond only to information received on the base MIDI channel, and will play only the sounds which are selected on the front panel.

- On the EDIT/System•MIDI page, set the MIDI mode parameter to MIDI IN MODE=POLY.
- Also on the EDIT/System•MIDI page, set the MIDI channel (MIDI BASE CHANNEL=__) to the MIDI channel you want the EPS-16 PLUS to receive on. The EPS-16 PLUS will respond only to data received on this MIDI channel.

MULTI Mode — The EPS-16 PLUS as Eight Independent Instruments

When you select MULTI mode on the EDIT/System•MIDI page, the EPS-16 PLUS becomes eight "virtual instruments," each receiving on its own MIDI channel, but all sharing the same twenty voices.

- On the EDIT/System•MIDI page, set the MIDI In mode parameter to MIDI IN M0DE=MULTI.
- For each instrument, set the MULTI IN MIDI CHANNEL parameter, found on the EDIT/Track page. The MIDI channels you select for each track should correspond to the MIDI channels that will be sent from the external sequencer.

Some Important Points about MULTI Mode

- Each of the eight Instrument•Tracks is completely independent and polyphonic. The EPS-16 PLUS' dynamic voice assignment means that each track can have up to all twenty voices if it needs them. If all twenty voices are in use and a track needs a voice, it will "steal" the voice from the oldest note playing.
- In MULTI mode it doesn't matter what instruments are selected or stacked on the front panel, the sound(s) you hear will depend entirely on what MIDI channel(s) the data is received on.
- In MULTI mode, program changes received by a given Instrument•Track on its MIDI channel will cause the EPS-16 PLUS to try to load a disk file into that Instrument•Track, replacing the instrument currently in that location.
- When using a MIDI sequencer it's generally a good practice to assign a certain MIDI channel (or channels) to each instrument in your rig and always leave it set to that channel.
- When recording in MULTI mode, the RECORD SOURCE parameter on the EDIT/Seq•Song page must also be set to MULTI.

Section 11 — Storage Functions

This section covers data storage functions that enable you to:

- save and load Instrument, Bank, Sequencer, and System data to/from disk, and
- transmit dumps containing Instruments, Banks, and Sequencer data via MIDI system exclusive messages.

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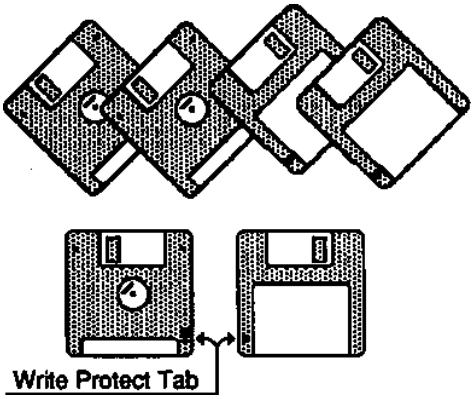
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Disk Storage — Using the Disk Drive to Save and Load Data

The EPS-16 PLUS' built-in disk drive can be used to store all your instrument, bank, and sequencer data, as well as System Exclusive messages from other MIDI devices. The EPS-16 PLUS uses a double-sided drive, which can store over 800 Kilobytes of data per disk. You should use Double-Sided Double-Density (DSDD) 3.5" micro-floppy disks for reliable disk operation. The disks are enclosed in a protective plastic carrier with an automatic shutter to protect the diskette from physical damage. It is important not to alter this carrier in any way.

The 3.5" disks have a sliding write-protection tab so that you can protect your own sounds and sequences against accidental erasure. Sliding the write-protection tab in the lower left corner of the disk so that the window is closed will allow you to store information on the disk. Sliding the tab so that the window is open will protect the disk against being accidentally reformatted or having files deleted.



Disks are a magnetic storage medium, and should be treated with the same care you'd give important audio tapes. You should keep your disks and the disk drive clean and free of dust, dirt, liquids, etc. Never put anything other than a disk in the disk drive. Do not expose disks to extremes of temperature or to strong magnetic fields. Also, never eject a disk while the drive is operating (the disk - drive light is on).

EPS-16 PLUS Disk File Types

The EPS-16 PLUS disk storage system has been designed to allow maximum flexibility in saving, loading and organizing your instrument and sequence data. Consequently, there are several different types of files that can be saved:

- **Instrument** — individual EPS-16 PLUS instruments can be saved.
- **Bank** — contain "snapshots" of instrument locations, mix, and panning, etc.
- **Sequence** — contains a single EPS-16 PLUS sequence.
- **Song** — contains an entire song along with its related sequences.
- **Effect** — contains an effect algorithm that can be loaded to the BANK effect slot.
- **MIDI System Exclusive data** — In addition to the above types of EPS-16 PLUS data, you can use the disk drive to save system exclusive data from other MIDI devices. The EPS-16 PLUS can thus serve as the "librarian" for your other MIDI gear. This function is covered at the end of this section.

- System Files — There are two additional types of files which have to do with system operation:

> **GLOBAL PARAMETERS** — Global Parameter files let you save the system, or "global" parameters, those contained on the EDIT/System•MIDI page, so that you can save and reload a new system configuration in seconds. This is handy if you use the EPS-16 PLUS in a number of different applications which require different settings for MIDI mode, MIDI base channel, master tuning, etc.

> **OS** — The computer program which controls the EPS-16 PLUS (the *Operating System,* or O.S.) is contained on a disk and is loaded into RAM upon booting. The disk that came with your EPS-16 PLUS contains the current O.S. Operating System upgrades will be available from your authorized ENSONIQ dealer as they are released Also, if the EPS-16 PLUS data should ever become corrupted, you might be prompted to reload the O.S. from disk. A function on the COMMAND/System•MIDI page allows you to copy the O.S. to a different disk.

> **DIRECTORIES** and **MACROS** — The file structure of the EPS-16 PLUS is set up so that each file category, called a *directory,* can hold up to 38 files. If any additional files are needed within the directory, a sub-directory must be created to hold those extra files. When working with a directory/file structure that is several layers deep, it is convenient to have a quick way to get to a sub-directory that is down deep in the structure. MACROS allow you to do that by using direct-dialing in much the same way that direct-dialing is used to access commands and parameters. Because it is highly unlikely that you will need to use directories, sub-directories, and macros when using floppy disks, they are covered in detail in the SCSI operation manual.

Disk Capacity — Bytes, Blocks and Files

Each double-sided 3.5" micro-floppy disk will hold 800k bytes of EPS-16 PLUS . data, which translates into about 1600 *Blocks.* (A Block is a handy unit which the EPS-16 PLUS uses to measure disk memory — 1 Block=512 bytes; 2 Blocks=lk bytes.)

EPS-16 PLUS disk files vary in size — how many will fit on a disk depends on the number and size of the files.

There are limits to the number of files on a disk:

- Each disk can hold a *maximum* of 156 files.
- A disk can hold up to 60 files of any one file type, but not more than the total of 156 files of all types for a single disk.

EPS-16 PLUS Disk Functions

FORMAT FLOPPY DISK — Formatting a Blank Disk

Before it can be used by the EPS-16 PLUS to store data, a disk must be formatted. Formatting puts information on the disk which the EPS-16 PLUS needs to read and write files. In addition to formatting a blank disk, the Format procedure can be used to reformat a disk which has been used with some other device, such as a personal computer or another musical instrument. Note that any data (of whatever type) on a disk will be lost when the disk is formatted by the EPS-16 PLUS.

To Format a blank disk:

- Insert a blank, Double-Sided Double-Density 3.5" micro-floppy disk into the disk drive, with the label-side facing left, and the metal shutter facing away from you. Make sure the plastic write-protect tab is in the closed position (no light showing through the window).
- Press *Command,* followed by the *System•MIDI* button.
- Press the *Right Arrow* button repeatedly until the following screen appears:



- Press *Enter•Yes.* The display will read DISK LABEL=DISK000
  Use the data slider and the arrow buttons to give the disk a unique name by which you can identify that disk. This is very *important,* as the EPS-16 PLUS will ask you for this disk by name if an instrument or song on the disk is used in a bank Also, make sure you write the Disk Label name on the outside of each disk after you are done formatting it.
- Press *Enter•Yes.* The display will read ERASE AND FORMAT DISK?
- Press the *Enter•Yes* button to proceed. (Pressing the *Cancel•No* button will return you to the COMMAND/System•MIDI page with no harm done.)
- While the EPS-16 PLUS is formatting the disk the display reads
  • FORMATTING• The formatting process takes about 80 seconds.
- When the formatting is done, the display reads DISK COMMAND COMPLETED, and then you are returned to the COMMAND/System•MIDI page. The disk is ready to accept instrument, bank, sequencer, or system data.

FORMAT FLOPPY DISK Messages:

- DISK DRIVE NOT READY — No disk in the drive.
- DISK FORMAT FAILURE -- DISK IS UNUSABLE. This indicates a defective disk. If you get this message we advise that you throw out the disk in question. Try again with another disk.
- DISK WRTTE-PROTECTED — The plastic write-protect tab in the lower-left corner of the disk must be closed (so you can't see through the hole) before anything can be written to the dislk. Close the write-protect tab and try again.

COPY FLOPPY — Making a Backup Copy of a Disk

The COPY function lets you duplicate the contents of one entire disk (the *source disk)* on another disk (the *destination disk).* It is a good practice to regularly back up your valuable data, including the OS disk which came with the EPS-16 PLUS, in this way,

Warning: This procedure uses the internal memory to temporarily hold the information while copying it between disks. Anything in the internal memory before you start will be erased. Save any important data before copying a disk.

To Make a Backup Copy of a Disk:

- Slide the plastic write-protect tab on the source disk—the original — so that the disk is write protected (you can see through the hole). This is an extra precaution to safeguard the data.
- Press *Command,* then the *System•MIDI* button.
- Press the *Right Arrow* button repeatedly until the display shows COPY FLOPPY.
- Press *Enter•Yes.* The display shows FUNCTION=COPY FLOPPY.
- Press *Enter•Yes.*
- At this point a prompt will appear in the display telling you that the internal memory must be erased. Press the *Enter•Yes* button to continue.
- The EPS-16 PLUS now asks you to insert the source disk (the one you want to copy). Insert the source disk, then press *Enter•Yes.*
- The drive will engage and the display will flash READING SOURCE DISK. Once the drive stops, the display will change to show INSERT BEST DISK.
- Insert the destination disk (the one you want to copy to), then press *Enter•Yes.*
- The drive will engage and the display will flash WRITING DEST DISK. Once the drive stops, the display will change to show INSERT SOURCE DISK.
- Repeat the preceding four steps as prompted by the EPS-16 PLUS display until the display reads DISK COMMAND COMPLETED.

Note: When a disk is copied, the Disk Label Number is copied from the source disk to the destination disk.

COPY FLOPPY messages:

- DISK WRTTE-PROTECTED — When asked for the destination disk you inserted a write-protected disk. The destination disk must have the write-protect window closed.
- DISK IS NOT SOURCE DISK or DISK IS NOT DESTINATION DISK — You put the wrong disk in the drive when prompted for a certain disk. This is not fatal; it doesn't abort the copy procedure. Just insert the asked-for disk and proceed.

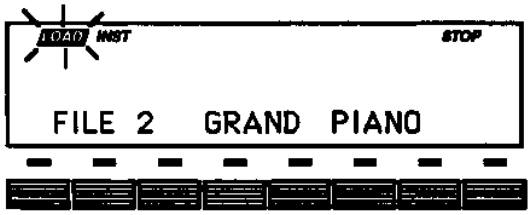
Loading and Saving EPS-16 PLUS Instruments and Banks

Loading an Instrument

You can load up to eight different instruments into the EPS-16 PLUS at once (within the limits of memory).

First, insert a disk containing one or more instrument files into the disk drive.

- Press *Load.* The LOAD indicator flashes.
- Press *Instrument.* The display looks like this:



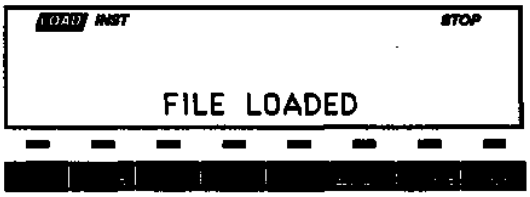
When the LOAD indicator is flashing, the EPS-16 PLUS is showing you disk files. (When LOAD flashes on the display, think of it as a question mark - the EPS-16 PLUS is saying "Load the file showing on the display?") Pressing the *Up/Down Arrow* buttons takes you through the instrument files on disk. If there are none, the display will read NO INSTRUMENTS.

Whenever a disk file is displayed as above, you can press the *Left* or *Right Arrow* button to see the size of that file in *Blocks* (a Block is 256 samples; 4 Blocks=lK samples). Press the *Left* or *Right Arrow* button again to return to the file name.

- Use the *Data Entry Slider* or the *Up/Down Arrow* buttons to view the various Instrument files on the disk. Each file has its own File Number. When an instrument file is showing, the INST indicator is lit The BANK indicator will light when a bank file is showing.

- Find the instrument you want to load, and press *Enter•Yes.* The display will say PICK INSTRUMENT BUTTON. The EPS-16 PLUS wants to know into which instrument location you wish to load the instrument

- Press any of the eight *Instrument•Track* buttons. The EPS-16 PLUS will begin immediately loading the instrument into the selected location. The display reads LOADING FILE... and the *LED flashes red* while the instrument is being loaded.



Once the instrument has been loaded, the display briefly shows FILE LOADED. The LED above the Instrument•Track button stops flashing and remains solidly lit red, indicating that there is now an instrument in that location which can be selected by pressing that button.

If you tell the EPS-16 PLUS to load an instrument into a location which already has an instrument loaded (LED lit), the new instrument will be loaded into that location and the one that was there will be automatically deleted.

- You might have to delete an instrument(s) before loading the new one. If there are already one or more instruments loaded into the EPS-16 PLUS, there might not be enough free memory to load the new one. In this case, the display will say PICK INST TO DELETE. At this point you have three choices. You can:

> Press any loaded instrument button. That instrument will be deleted from memory and the new one will be loaded; or

> Press *Enter•Yes.* The EPS-16 PLUS will delete an instrument (or instruments, as needed) for you, starting from the *highest-numbered* one in memory; or

> Press *Cancel•No.* The Load command will be canceled with no harm done.

Note: You can continue to select and play existing instruments while the new one loads.

Saving an Instrument to Disk

After you have created a new EPS-16 PLUS instrument, or made changes to an existing instrument, you can save the instrument to a formatted EPS-16 PLUS disk with the following steps:

- Insert a formatted disk into the drive. If you don't have a formatted disk, format one before proceeding (see Format Floppy Disk earlier this section).
- Press *Command,* then press *Instrument.* This puts you on the COMMAND/Instrument page, which contains all the instrument-related commands. Check to make sure that the instrument you want to save is selected. If not, press its Instrument•Track button to select it
- Press the *Left* or *Right Arrow* button until the display reads SAVE INSTRUMENT. (Or use this shortcut — after pressing *Command,* double-click on the *Instrument* button.)
- Press *Enter•Yes.*
- Edit the Instrument Name (if needed):

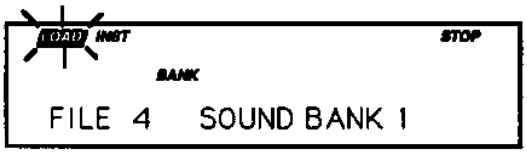


The display shows the current name with a cursor (underline) beneath the first character. If you want to give the instrument a new name, do so at this time. Use the *Data Entry Slider* or the *Up/Down Arrow* buttons to change the underlined character, then press the *Left* or *Right Arrow* button to move the underline. Repeat until the display shows the name you want. (If you don't need to rename the instrument, just skip this step.)

- Press *Enter•Yes.*
  The display will read SAVING <INST NAME> while the instrument is being saved. Note that you can continue playing the instrument while it is being saved, and you can select other instruments. You cannot get out of COMMAND mode until the save procedure is done.
- If there is already an instrument file with the same name on the disk, the display will ask DELETE OLD VERSION? Press *Enter•Yes* to save the instrument, replacing the one on the disk. This is for updating instruments to which you have made changes. Or press *Cancel•No* to abort the procedure.
- If there is not enough free space on the disk for the instrument, the display will say NO ROOM ON DISK. Save the instrument to another disk (or delete some files from the disk).

To Load a Bank

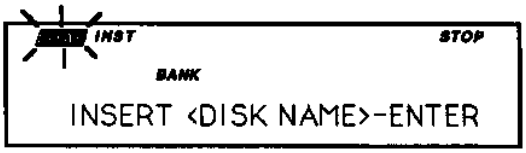
- Press *Load,* then *Instrument.*
- Use the *Up/Down Arrow* buttons to view the different files.



When a bank file is showing, the BANK indicator lights on the display along with the INST indicator.

- Once a bank file is showing, press *Enter•Yes.* The EPS-16 PLUS will begin loading the instruments and the song data. As it loads each instrument the display tells you what it doing. As soon as any of the instruments is finished loading you can select that instrument and play while the rest of the bank loads.

At some point in the loading process, you may encounter the following message:



This prompt is informing you that an instrument or song saved as part of the bank is on a different disk than the disk currently in the drive. When this occurs:

- Eject the current disk in the disk drive and replace it with the disk that matches the Disk Label ID requested by the EPS-16 PLUS (you are writing these names on your disks, aren't you?). For more information on Disk Label identification see *Section 2 — System Control*
- Press *Enter*. The EPS-16 PLUS will resume loading until completed, or until the point when it needs another disk.
- When it has done loading the instruments, the EPS-16 PLUS will load the song (if any) and then set up any copied instruments included in the bank.

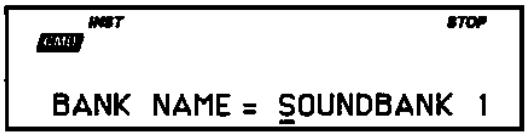
Saving the Contents of Memory as a Bank

Saving a bank is like taking a "snapshot" of the contents of the EPS-16 PLUS memory. When you later load a bank the EPS-16 PLUS "looks" at that snapshot and tries to recreate what was in memory when the bank was saved. You can use banks to automatically load a new group of instruments and/or a new song.

Banks are valuable for this reason: EPS-16 PLUS songs and sequences have no way of knowing which instruments are loaded into various Instrument•Track locations. Suppose, for example, you record a track with a piano instrument, but then load a kazoo sample into the instrument location where the piano was. The track will now play on the kazoo. By using banks you can avoid this sort of thing.

It's easy to save the contents of the EPS-16 PLUS memory as a bank. Just bear in mind that any instruments in the internal memory, as well as the song, must be saved separately before they can be saved as a bank.

- Save any instruments in memory to disk using the SAVE INSTRUMENT command on the COMMAND/Instrument page.
- Save the song to disk (if you want a song as part of the bank) using the SAVE SONG + ALL SEQS command on the COMMAND/Seq•Song page.
- Press *Command*, then *Instrument*.
- Press the *Left* or *Right Arrow* button until the display reads SAVE BANK.
- Press *Enter•Yes*. The display shows:



The display shows the current name with a cursor (underline) beneath the first character. If you want to give the bank a new name, do so at this time. Use the *Data Entry Slider* or the *Up/Down Arrow* buttons to change the underlined character, then press the *Left* or *Right Arrow* button to move the underline. Repeat until the display shows the name you want. (If you are updating an existing bank, don't rename the bank; just press *Enter•Yes* and then press *Enter•Yes* once more in response to the question DELETE OLD VERSION?)

- Press *Enter•Yes*.

It's not necessary for the instruments and song to be saved on the same disk as the bank. Each instrument, the song and the bank can be saved on separate disks.

Deleting an Instrument or Bank File from a Disk

Deleting of disk files is done from LOAD mode. To delete (erase) an instrument or bank from a disk:

- Press *Load,* then press *Instrument.*
- Press the *Up* or *Down Arrow* button until the file you want to delete is showing on the display.
- While holding down the *Load* button, press *Cancel•No.* The display will ask DELETE <FILE NAME>?
- Press *Enter•Yes.*

Loading and Saving EPS-16 PLUS Sequencer Data

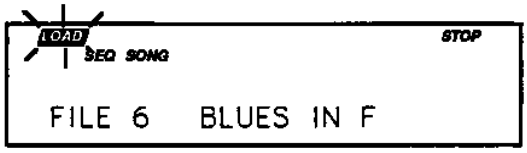
There are two ways that EPS-16 PLUS Sequencer data can be stored on a disk:

- **SONG File.** A song file contains a song *and* all its related sequences. Loading a song file from disk will completely erase the current contents of the EPS-16 PLUS sequencer memory, replacing whatever is there with the song and sequences from the disk file.
- **SINGLE SEQUENCE File.** This type of file contains just one sequence. Loading a single sequence file will *not* erase the sequencer data already in memory — the new sequence simply becomes one more sequence in the internal memory which can be selected or used as a step in a song. There can be up to eighty sequences in memory at once.

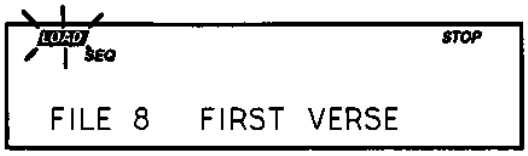
Loading a **Song or a Single Sequence from Disk**

Both types of sequencer files are accessed from the LOAD/Seq•Song page.

- Press *Load,* then press *Seq•Song.*
  The LOAD indicator flashes, meaning that the EPS-16 PLUS is showing you disk files.
- Press the *Up* or *Down Arrow* button until the file you want to Load is showing on the display:



When a SONG file is showing, the SONG indicator lights next to the SEQ indicator.



When a SINGLE SEQUENCE file is showing, only the SEQ indicator lights.

- Press *Enter•Yes* to load the sequencer file showing on the display.
  After you have loaded a song or sequence, it is automatically selected. Just press *Play* to play it.

Important: Keep in mind that loading a song or sequence does not ensure that the right instruments are loaded into the proper Instrument•Track locations. Each track of each sequence will play whatever instrument is in that location at the time. The way to make sure everything is in the right place is to save the contents of memory (including the song) as a bank.

Saving a Single Sequence to Disk

Use the SAVE CURRENT SEQUENCE command to save a single sequence.

- On the EDIT/Seq•Song page, select the sequence you want to save.
- Insert a formatted disk into the drive.
- Press *Command,* then press *Seq•Song.*
- Press the *Left* or *Right Arrow* button until the display reads SAVE CURRENT SEQUENCE.
- Press *Enter•Yes.*
- Edit the Sequence Name (if needed):



The display shows the current name of the sequence, with a cursor (underline) beneath the first character. If you want to give the sequence a new name, do so at this time. Use the *Data Entry Slider* or the *Up/Down Arrow* buttons to change the underlined character, then press the *Left/Right Arrow* buttons to move the underline. Repeat until the display shows the name you want. (If you don't need to rename the sequence, just skip this step.)

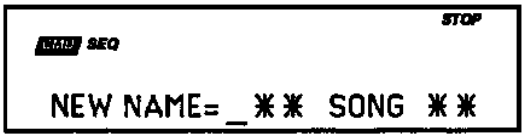
- Press *Enter•Yes.* The display will read SAVING <FILE NAME> while the sequence is being saved.
- If there is already a sequence file with the same name on the disk, the display will ask DELETE OLD VERSION? Press *Enter•Yes* to save the sequence, replacing the one on the disk. Or press *Cancel•No* to abort the procedure.
- If there is not enough free space on the disk, the display will say NO ROOM ON DISK. Save the sequence to another disk (or delete some files from the disk).
- If you try to SAVE CURRENT SEQUENCE while the song is selected, the EPS-16 PLUS will not execute the command, responding USE SAVE SONG + ALL. Again, make sure the sequence is selected before trying to save it

Saving a Song (along with all Sequences) to Disk

Once you have created a song or made changes to an existing one, you can save the song to a formatted EPS-16 PLUS disk. In addition to saving the song itself, the SAVE SONG + ALL SEQS command saves all the individual sequences currently in memory (whether they are involved in the song or not). To save a song:

- Insert a formatted disk into the drive.
- Press *Command,* then press *Seq•Song.*

- Press the *Left* or *Right Arrow* button until the display reads SAVE SONG + ALLSEQS.
- Press *Enter•Yes.*
- Edit the song name (if needed):



The display shows the current name of the song, with a cursor (underline) beneath the first character. If you want to give the song a new name, do so at this time. Use the *Data Entry Slider* or the *Up/Down Arrow* buttons to change the underlined character, then press the *Left/Right Arrow* buttons to move the underline. Repeat until the display shows the name you want. (If you don't need to rename the song, just skip this step.)

- Press *Enter•Yes.* The display will read SAVING <SONG NAME> while the song is being saved.
- If there is already a song file with the same name on the disk, the display will ask DELETE OLD VERSION? Press *Enter•Yes* to save the song, replacing the one on the disk. This is for updating songs to which you have made changes. Or press *Cancel•No* to abort the procedure.
- If there is not enough free space on the disk, the display will say NO ROOM ON DISK. Save the song to another disk (or delete some files from the disk).
- Note that the song and all sequences in memory are saved as one file. You cannot later extract a single sequence from a song file and load it separately. If you want access to a sequence individually you must save it using the SAVE CURRENT SEQUENCE command.

Deleting a Song or Sequence File from a Disk

Deleting of disk files is done from LOAD mode. To delete (erase) a sequencer file from a disk:

- Press *Load,* then press *Seq•Song.*
- Press the *Up* or *Down Arrow* button until the file you want to delete is showing on the display.
- While holding down the *Load* button, press *Cancel•No.* The display will ask DELETE <FILE NAME>?
- Press *Enter•Yes.*

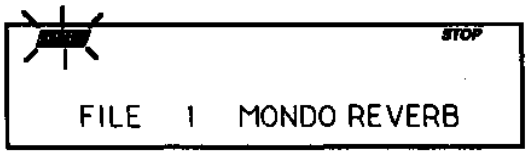
Loading and Saving EPS-16 PLUS Effects

Loading an Effect

You can load an effect from disk into the internal memory of the EPS-16 PLUS. The effect will load into the BANK effect location, replacing whatever effect was there previously.

First, insert a disk containing one or more effect files into the disk drive.

- Press *Load.* The LOAD indicator flashes.
- Press *Effect.* The display looks like this:



When the LOAD indicator is flashing, the EPS-16 PLUS is showing you disk files. Pressing the *Up/Down Arrow* buttons takes you through the effect files on disk. If there are none, the display will read NO EFFECTS.

Whenever a disk file is displayed as above, you can press the *Left* or *Right Arrow* button to see the size of that file in *Blocks* (a Block is 256 samples; 4 Blocks=lK samples). Press the *Left* or *Right Arrow* button again to return to the file name.

- Use the *Data Entry Slider* or the *Up/Down Arrow* buttons to view the various effect files on the disk. Each file has its own File Number.

- Find the effect you want to load, and press *Enter•Yes.* The EPS-16 PLUS will load that effect into the BANK effect slot When finished, the display will say DISK COMMAND COMPLETED.

Saving an Effect to Disk

Use the SAVE BANK EFFECT command to save an effect to disk. If you wish to save, as a separate effects file, either a ROM effect or an Instrument effect, you must first copy the effect into the bank effect using the COPY CURRENT EFFECT parameter on the COMMAND/Effects page (see *Section 4—Effects)* and then save it.

- Insert a formatted disk into the drive.
- Press *Command,* then press *Effect.*
- Press the *Left* or *Right Arrow* button until the display reads SAVE EFFECT.
- Press *Enter•Yes.*
- Edit the effect name (if needed):

The display shows the current name of the effect, with a cursor (underline) beneath the first character. If you want to give the effect a new name, do so at this time. Use the *Data Entry Slider* or the *Up/Down Arrow* buttons to change the underlined character, then press the *Left/Right Arrow* buttons to move the underline. Repeat until the display shows the name you want If you are saving a ROM effect, the name will not be able to be edited. (If you don't need to rename the effect, just skip this step.)

- Press *Enter•Yes.* The display will read SAVING <FILE NAME> while the effect is being saved.
- If there is already an effect file with the same name on the disk, the display will ask DELETE OLD VERSION? Press *Enter•Yes* to save the effect, replacing the one on the disk. Or press *Cancel•No* to abort the procedure.
- If there is not enough free space on the disk, the display will say NO ROOM ON DISK. Save the effect to another disk (or delete some files from the disk).

A Note About Saving and Loading from FLASHBANK and Hard Drives

The preceding discussion has dealt with saving and loading EPS-16 PLUS files using the built-in 3.5 inch floppy disk drive. You can also use the optional FB-1 or FB-2 FLASHBANK memory to save sounds, or a hard drive (through the optional SP-2 SCSI kit) to save sounds, banks, and sequence memory. Much of the saving and loading procedure is similar to using the floppy disk drive. However, if you are using these items, please refer to the manual that came with the accessory for complete details.

MIDI System Exclusive Recorder

What is System Exclusives Data?

Some MIDI information — such as key events, controllers, program changes, etc. — is understood by virtually all MIDI devices, regardless of manufacturer. The common ability to send and receive these messages is what allows you to play any MIDI synth from any other, to change programs and volume remotely, to start and stop sequencers and drum machines together, and the many other performance miracles we have come to expect from MIDI.

There are other messages which each manufacturer has reserved for communicating specific information with a specific machine (or family of machines). These machine-specific messages are called *System Exclusive* (or Sys-Ex) messages, since they are meant to be recognized only by a particular device and ignored by all others (i.e. they are exclusive to a particular system).

System Exclusive Storage

It is not strictly necessary, however, for the receiving system to understand the data it receives, if the purpose is to store it for later reloading into the original system (just as it's not necessary for a file cabinet to understand the pieces of paper you file there). The EPS-16 PLUS can receive any MIDI System Exclusive message up to 288K and save it to disk without having the slightest notion what it means or what type of device it came from. When you want to send the data back to the original device, you just load the data from disk back into the EPS-16 PLUS, which will then re-transmit the message exactly as it was received.

Here are a few examples of the kinds of information which you can use the EPS-16 PLUS to store in this way:

- The program (patch) memory of virtually any MIDI synthesizer.
- The pattern memory a drum machine.
- The sequence memory of a MIDI sequencer.
- The preset memory of any MIDI reverb or other effects device which can send and receive it.

In short, any MIDI data (within memory limits) which can be transmitted from one device to another can be received and stored by the EPS-16 PLUS. With the EPS-16 PLUS at the heart of your system you now have disk storage for the data in all your MIDI instruments.

Saving Sys-Ex Data Uses the Internal Memory

The EPS-16 PLUS uses the RAM (Random Access Memory) that is normally devoted to instruments, banks, and the sequencer to "buffer" incoming System Exclusive messages before saving them to disk. A buffer is an area of memory. where data is held temporarily. When the EPS-16 PLUS receives a System Exclusive data dump, it stores it in the internal memory until you save the data to disk.

Important: *You must save all instrument, bank, and sequencer memory before using the System Exclusive Recorder function to receive data.*

Loading Sys-Ex data from disk to an external device will not necessarily clear the internal memory. If there is enough unused sequencer memory to load and transmit the Sys-Ex message, the memory will not be affected. If there is not enough memory, you will be prompted to delete instruments until enough memory is available.

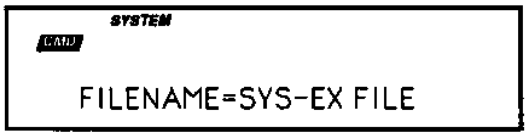
Saving System Exclusive Data from an External Device

Using the EPS-16 PLUS' disk drive for storing data from external devices is a three-step process:

1) first get the EPS-16 PLUS ready to receive the data via MIDI;
2) next, send the data from the external device to the EPS-16 PLUS; and finally
3) the data to a disk with the EPS-16 PLUS' disk drive.

To save System Exclusive data from an external MIDI device:

- Connect the MIDI Out of the sending device to the MIDI In of the EPS-16 PLUS.
- Insert a formatted double-sided 3.5" disk into the EPS-16 PLUS disk drive.
- Press *Command,* then *System•MIDI.*
- Press the *Right Arrow* button repeatedly until the display reads: MIDI SYS-EX RECORDER
- Press *Enter•Yes.* The display shows the prompt: MUST ERASE MEMORY OK? to warn you that any instruments, banks, sequences, and songs currently in memory will be lost. It's not too late, however, to quit and preserve the internal memory intact. Pressing *Cancel•No* at this point will return you to the COMMAND/System•MIDI page without erasing the internal memory, allowing you to save it to disk before proceeding.
- Press *Enter•Yes.* The display shows WAITING...
- From the external MIDI device, transmit the System Exclusive data. The display will flash RECEIVING... while the data is being sent.
- When the full message has been received, the display will read CANCEL=QUIT ENTER=SAVE to indicate that a complete message was recorded.
- Once you have successfully received the Sys-Ex message (or messages), press the *Enter•Yes* button to begin the process of saving the MIDI data to disk. The following display appears:



- Name the file with a 12-character name of your choice using the *Data Entry Slider* or the *Up/Down Arrow* buttons to change the underlined character, and the *Left/Right Arrow* buttons to move the underline. Repeat until the display shows the name you want.
- Press *Enter•Yes.* The display reads SAVING <FILENAME> while the data is being saved. Or press *Cancel•No* to cancel the procedure for any reason.

- If there is a Sys-Ex file with the same name already on the disk, the EPS-16 PLUS will ask DELETE OLD VERSION? Press *Enter•Yes* to save the file, replacing the one on the disk. This is for updating files to which you have made changes. Or press *Cancel•No* to abort the procedure.
- After the file is saved, the EPS-16 PLUS returns to the FILENAME=<FILENAME> screen, so that you can save the a backup copy of the data to a different disk if you wish. Press *Cancel•No* (or any other front panel button) to exit.

Messages: If during the reception of Sys-Ex data the EPS-16 PLUS display reads STATUS=INCOMPLETE, this means it did not receive an "End Of Exclusive" after the System Exclusive message. This would indicate that external device did not transmit a complete message for some reason. Press *Cancel•No* and try again.

If the EPS-16 PLUS display reads STATUS=MEMORY FULL, this means it ran out of memory with which to "buffer" the incoming data. (The maximum amount which can be received is 576 blocks.) After receiving the Memory Full message you can still save the file, but it is almost certain that the last Sys-Ex message received is incomplete and will not be able to be received successfully when retransmitted.

Loading System Exclusive Data from Disk to an External Device

After you have saved a System Exclusive message from an external MIDI instrument, getting the data back to the original instrument involves three steps:

1) First, prepare the receiving instrument(s) to receive System Exclusive messages via MIDI;
2) next, load the data from the EPS-16 PLUS' disk drive into memory; and then
3) send the data to the remote instrument(s) from the EPS-16 PLUS.

To Load (and Transmit) a System Exclusive File from disk:

- Connect the MIDI Out of the EPS-16 PLUS to the MIDI In of the receiving device(s).
- Enable the receiving instrument(s) to receive System Exclusive messages. Many devices have a switch or a parameter which enables or disables the receiving of System Exclusive messages. Consult the manual of each particular device for details.
- Insert the disk containing the Sys-Ex data into the disk drive.
- Press *Load,* followed by the *System•MIDI* button.
- Use the *Up/Down Arrow* buttons to scroll through the files.
- Press *Enter•Yes.* LOADING <FILE NAME> will appear on the screen as the EPS-16 PLUS load the Sys-Ex data from its disk drive into its internal memory. When completed, the display will look like this:



- Press *Enter•Yes* to send the data. The display will flash SENDING DATA... When completed, the display will return to the QUIT/SEND screen.
- Check the receiving instrument(s) to see that the data was received correctly. If it wasn't, make sure that:
  > the MIDI connections are correct (EPS-16 PLUS' MIDI Out to the receiving device's MIDI In),
  > the receiving device(s) is enabled to receive System Exclusive messages,
  > the receiving device(s) is set to the same MIDI base channel(s) as when the data was initially sent to the EPS-16 PLUS.

  Then press *Enter•Yes* again, and the data will be transmitted again. You can keep repeating this until the data has been successfully received by the remote device(s).
- Once the data has been successfully transmitted, press *Cancel•No.*

EPS-16 PLUS Disk Messages

WARNINGS

Warnings are displayed for one second and indicate either successful completion or non-fatal error conditions encountered during a disk operation.

- DISK COMMAND COMPLETED — indicates that the disk operation was completed successfully.
- DISK WRTTE-PROTECTED — appears during SAVE or DELETE operations if the diskette is write-protected.
- DISK HAS BEEN CHANGED — appears when you begin to LOAD, SAVE or DELETE when the disk in the drive has been changed since the last time the EPS-16 PLUS loaded a disk directory.
- DISK DRIVE NOT READY — usually indicates that there is no diskette in the drive, although it can indicate a hardware problem if it persists.
- NOT ENOUGH DISK SPACE — indicates that there are not enough available sectors on diskette or hard drive to save the file.
- FILE DOES NOT EXIST — appears when you try to LOAD or DELETE when the display shows FILE=NO <FILE TYPE>.
- NO SYS EX DATA TO SAVE — indicates that there is no data in the Sys-Ex Recorder to save.
- FILE TOO LARGE TO LOAD — indicates that the sequence data in the disk file will not fit into the free memory. Delete sequences or songs to make some memory available. If that does not work, the file may have been saved from a system with expanded memory.

ERROR MESSAGES

Error messages are always accompanied by the PRESS ANY BUTTON TO CONTINUE... prompt, and remain on the screen until any button is pressed. These messages indicate serious error conditions which interrupted the disk operation. These errors may have prevented the correct saving or loading of the data in the file(s).

- DISK DRIVE NOT RESPONDING — indicates either that there is no diskette in the drive or that there are hardware problems.
- DISK NOT FORMATTED — the disk format was not recognized, and the disk is either blank or formatted for some other system.
- NOT EPS-16 PLUS DISK — the disk format was recognized, but the disk does not contain EPS-16 PLUS data.

- DISK ERROR - WRITE VERIFY — during a SAVE operation, the data written could not be verified. Probably indicates a bad disk sector. The file may be unusable.

- DISK ERROR - LOST DATA — during a disk read operation, the system missed data coming from the disk. Probably indicates a hardware problem. The file may be unusable.

- FILE OPERATION ERROR — one of a number of possible fatal errors occurred during a disk operation. Probably caused by a low-level hardware or software error, although the disk may be bad.

- DISK ERROR - BAD DATA — during a file operation, the CRC (error checking code) of the data block was incorrect. Probably indicates a bad disk sector. The file may be unusable.

- DISK ERROR - BAD DISK OS — during a file operation, the CRC of the Disk OS Program Control Block was incorrect. Probably indicates a bad disk sector. The disk may be unusable.

- DISK ERROR - BAD DIRECTORY— during a file operation, the CRC of the Directory blocks was incorrect Probably indicates a bad disk sector. The disk may be unusable.

- DISK ERROR - BAD FAT — during a file operation, the CRC of the FAT (File Allocation Table) block was incorrect Probably indicates a bad disk sector. The disk may be unusable.

- DISK ERROR - BAD DEVICE ID — during a file operation, the CRC of the Device ID block was incorrect Probably indicates a bad disk sector. The disk may be unusable.

- FORMAT FAILED - BAD DISK — during formatting, a bad disk sector was detected. The disk may be defective, and should not be used.

- OS NOT ON DISK — the system was unable to find the OS file on the disk. The file may be unusable.

- DISK COPY NOT COMPLETED — appears if *Cancel•No* is pressed during the Disk Copy procedure.

Appendix — EPS-16 PLUS Implementation

The EPS-16 PLUS features extensive MIDI (Musical Instrument Digital Interface) implementation. For normal applications, you will find all the information you need regarding the EPS-16 PLUS'S MIDI functions in this manual. You can also refer to the MIDI Implementation Chart on the next page for a summary of the EPS-16 PLUS MIDI implementation.

If you are writing a computer program to communicate with the EPS-16 PLUS via MIDI, or otherwise require a copy of the full EPS-16 PLUS MIDI Specification, it is available free of charge by writing to:

ENSONIQ Corp
MIDI Specification Desk
155 Great Valley Parkway
Malvern, PA 19355

Include in your written request your name and address, and indicate that you would like a copy of the "EPS-16 PLUS External MIDI Specification." Please allow 2 to 3 weeks for delivery.

MODEL: EPS-16 PLUS MIDI Implementation Chart Version: 1.0

Function...		Transmitted	Recognized	Remarks
Basic Channel	Default Channel	1 1 - 16	1 1 - 16	
Mode	Default Messages Altered	1 X X	1, 3, 4, Multi X X	memorized (Global Controllers In MONO Mode)
Note Number	True Voice	21 - 108	21 - 108	
Velocity	Note ON Note OFF	O X*	O X	
After Touch	Key's Ch's	O O	O O	
Pitch Bender		O	O	
Control Change		1 - 95 1 Mod Wheel 4 Foot 6 Data 7 Volume 70 Momentary Patch Select 100 Registered Param Select 101 Registered Param Select	1 - 95 1 Mod Wheel 4 Foot 6 Data 7 Volume 70 Momentary Patch Select 100 Registered Param Select 101 Registered Param Select	programmable
Prog Change	True #	0 - 127	0 - 23 0 - 39	In OMNI, POLY & MONO A in MULTI & MONO B
System Exclusive		O	O	
System Common	: Song Pos : Song Sel : Tune	O O X	O O X	
System Real Time	: Clock : Commands	O Clock O Start, Stop, Cont	O Clock O Start, Stop, Cont	
Aux Mes-sages	: Local On/Off : All Notes Off : Active Sense : Reset	X X X X	X O ** X X	
Notes	* A Note Off velocity of 64 is always sent for all keys. ** Recognized by rackmount unit only.			

Mode 1: OMNI ON, POLY
Mode 2: OMNI ON, MONO
Mode 3: OMNI OFF, POLY
Mode 4: OMNI OFF MONO

O : YES
X : NO

2nd Release:
7-1, 13-14

44KHZ Delays:
4-3, 9

44KHZ Reverb:
4-1, 3, 8

A - B Fade In:
6-27

About Banks:
1-20; 3-3

About Filters:
7-1, 20

About Modulation:
7-4

About Performance Presets:
3-,4-6
10-5

AC line conditioning:
1-4

Accessories:
1-2, 25-26

Add Data:
6-23

ADSR:
7-12

Aliasing:
5-, 3

AMP:
1-5
2-5
4-2-3, 5, 15-17
5-7
6-2, 9, 19, 25
7-2, 24-25

Amplification:
1-5-6

Append:
6-22
9-1, 4

Append Sequence:
9-4

Attack:
5-12, 15-16
7-1, 12, 14, 29-30

Attack Time Velocity:
7-14

Auditioning Changes:
9-13

Auto Locate:
8-7

Auto-Loop Finding:
2-1; 5-14, 16;
6-5, 11

Aux Foot Switch:
2-1

Auxiliary Foot Switch:
1-9; 2-4; 8-4, 6

Bank:
1-19-21, 25
2-6, 12
3-2-5, 19
4-1-2, 4-5, 18
5-9
8-4, 6, 13, 16, 20
11-1-2, 4, 6, 8-10, 14, 17

Bank Effect:
3-19
4-2, 4, 18
11-2, 14

Bar:
10-5
2-11
8-7, 9, 12, 14
9-4, 6-8, 10-11, 14

Base Channel:
2-1, 6, 8-9, 11
3-13
10-6-7
11-3, 20

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