

The Cheetah Cheater

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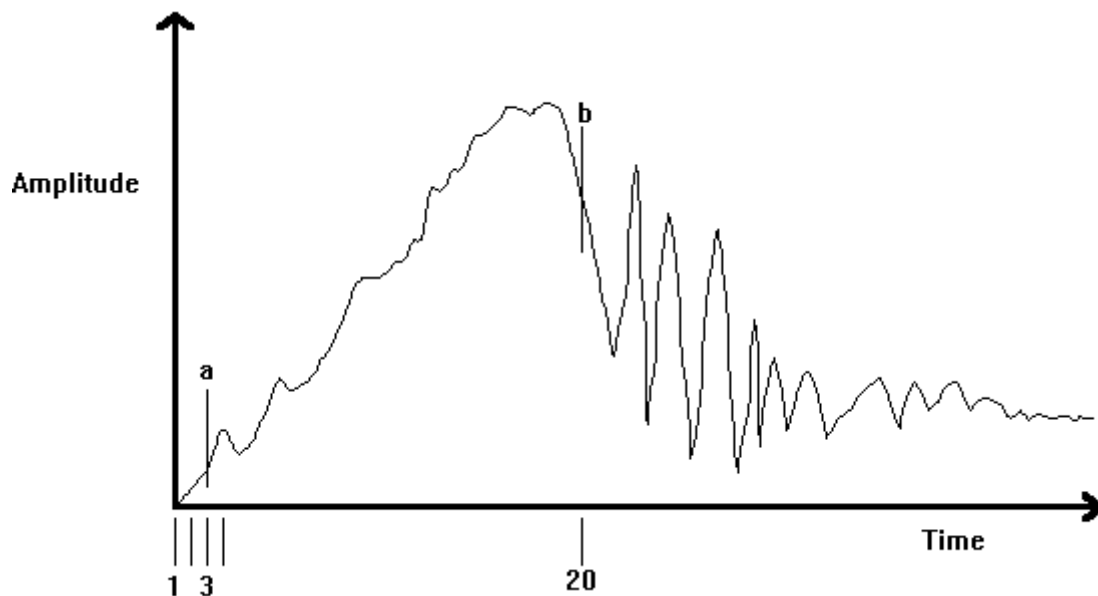
What is a Sampler?

Consider sound. All sound, no matter its source, is by nature analogue in its manner. It will continually vary in pitch and amplitude over time and more often than not its behaviour is unpredictable. This makes using sound in a computer environment difficult unless some way can be made to convert the analogue sound into a digital form that the computer is happiest with.

The process that a computer will use for this conversion is commonly called an A to D converter, or A/DC. The A/DC will analyse the analogue information it 'hears' and proceed to take digital snapshots of the input at pre-determined intervals of time. These 'snapshots' will take the form of a word of data. The length of this word will be determined by the memory addressing used by the computer, usually, either 8 or 16-bits. Thus, the A/DC will build-up a digital map of the sampled sound. Replay of the digital information is a reverse of the process but employing a Digital to Analogue Converter.

This digital transformation is, basically, the function of the SAMPLER, and although they come in all sorts of Rack Units and user interfaces, they will all perform the same task.

Because each individual sample of the input will use one word of data, the total collection of samples will utilise a large slice of the computer's memory. Dedicated samplers, therefore, require a large amount of Random Access Memory (RAM) in order that the sampler can be used effectively.



Consider the above waveform generated at the sampler's input. The waveform is shown on an Amplitude/Time graph, with divisions for the sample snapshot shown on the time axis.

Sampling at timeslot 3 will cause the sampler to analyse the sound and convert to a word, e.g., 'a' in the above graph could become 0000101101100000, 'b' 1000101100111100, etc..

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These binary digits are then stored in the next available memory address. The process will occur as many times as necessary according to the Sampling Frequency and the length of the sample. At 48kHz a sample is taken every 0.0000208 seconds, at 24kHz, a sample is taken every 0.0000416 seconds. So, therefore, a 48kHz sampling frequency will sample twice as many times as at 24kHz. Conversely, the number of samples taken at 24kHz is half that as taken at 48kHz, resulting in loss of quality in the reproduction.

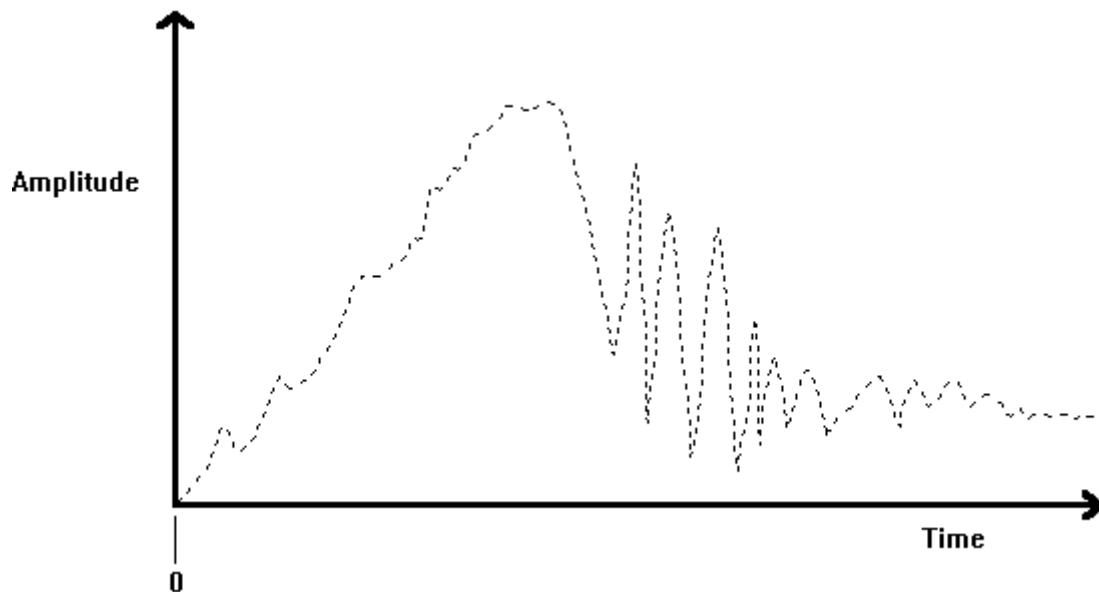
It follows, therefore, that the lower sampling rate will result in less RAM being used for the same sample, but what causes the loss of quality?

Let us now return to the waveform. Assume that the complete waveform has been sampled at 24kHz and stored into memory.

On playback the sampler will take each value from memory and reconvert the digital 'sound' to analogue for process through the output amplifiers.

As the waveform is reconstituted, all of the sample points will be converted as they were recorded, i.e., every 0.0000416 seconds at 24kHz.

This will cause the original waveform to now appear as a series of points 0.0000416 seconds apart:



Now, when the sample is replayed, only the 'points' are played. The minute gaps between the points are not discernible by the human ear, so we hear the sound of the sample as one continuous noise.

The re-plotting of the sample will, effectively, make the sample sound as if it were muffled as the plotted resolution of the played back sample will remove some of the higher frequencies of the original sound.

All of the above will make the listener feel that the quality of the original sound has deteriorated, where, in actual fact, it is the replotting and high frequency filtering that has fundamentally changed the original sound.

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If the sampling frequency is reduced to its lowest level then the time between samples is greatly increased. Setting the frequency to 2kHz will make the sampler replot the waveform at points every 0.0005 seconds. As the sampler will plot the same number of samples the resulting sound will be that much longer. Assume that the original sample is one second long, then when it is replayed at 2kHz the sample will now be 12 seconds long.

This has the effect of stretching the original sample such that its pitch appears much lower in the register. Some samplers will allow what is termed 'time-stretching' that will allow the changing of playback sample without altering the pitch. The SX-16 is, unfortunately, not one of them. Consequently, playing the samples at different frequencies will always affect the length of the sample.

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The Cheetah SX-16 Sampler

Consider an A/D Converter, as in the example discussed, that is capable of storage of up to 16 stereo sounds in 16 bit resolution that are controllable via MIDI and can be directed to any one of 8 audio outputs. This is essentially the Cheetah SX-16 Sampler.

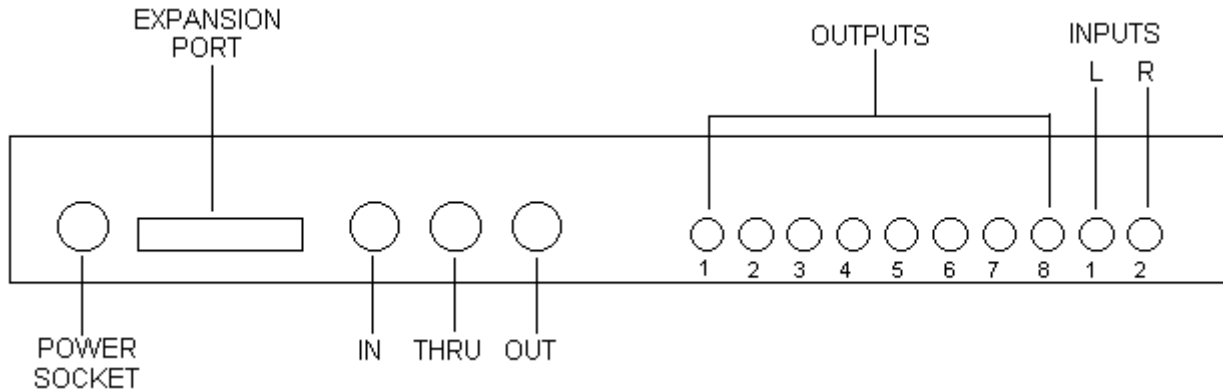
Used in a MIDI network the SX-16 can be used to provide high quality samples to add to the facilities on offer from synthesisers, drum machines, etc. and, although setting up the SX can be a long winded affair, it can provide some useful functions to enable full use of its capabilities:

- The ability to store samples on 3½ Floppy Disc
- The ability to save all samples and system set-up as one whole file
- All samples can be used on the same MIDI Channel and/or outputs
- The ability to both sample and replay in Stereo
- Sampling rates from 6kHz to 48kHz
- Sample replay rates from 2kHz to 99kHz
- 16 bit sample resolution
- Up to 8 voice polyphonic
- Up to 16 voices in memory at any one time
- Limited filtering of recorded sounds
- Atari ST Disc Format compatibility
- The ability to read and load AKAI S900/S1000 discs
- 512kB memory expandable to 2MB

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The SX-16 Externals

The SX-16 is a 1U 19" Rack module. The back of the unit consists of 8 ¼" jack sockets for outputs, 2 ¼" jack sockets for inputs, MIDI IN, OUT and THRU, a 5-pin Power socket and a 25 way 'D' type plug for expansion purposes (although Cheetah have never developed the hardware necessary to use it):



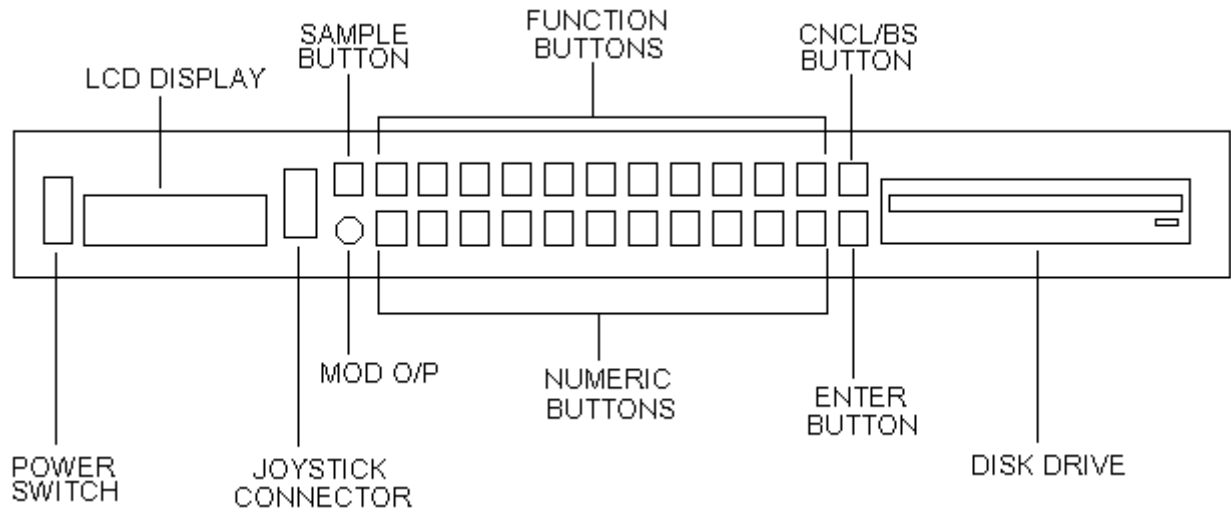
The front of the SX-16 is a little harder to get to grips with. Contained on the front panel are the Power Switch, Disk Drive, Modulator/joystick connections and a myriad number of buttons for setting all options for the sampler.

Also included on the front panel is a small 2 x 16 character LCD display, that will give information dependant on the task being performed.

Almost all of the buttons have more than one function, depending on the function being performed, the primary and secondary functions being shown in white legend above the appropriate button. All of the buttons and their function for each mode of operation are detailed in the respective sections of this manual.

The diagram below shows the physical locations of the front panel rather than specific panel details.

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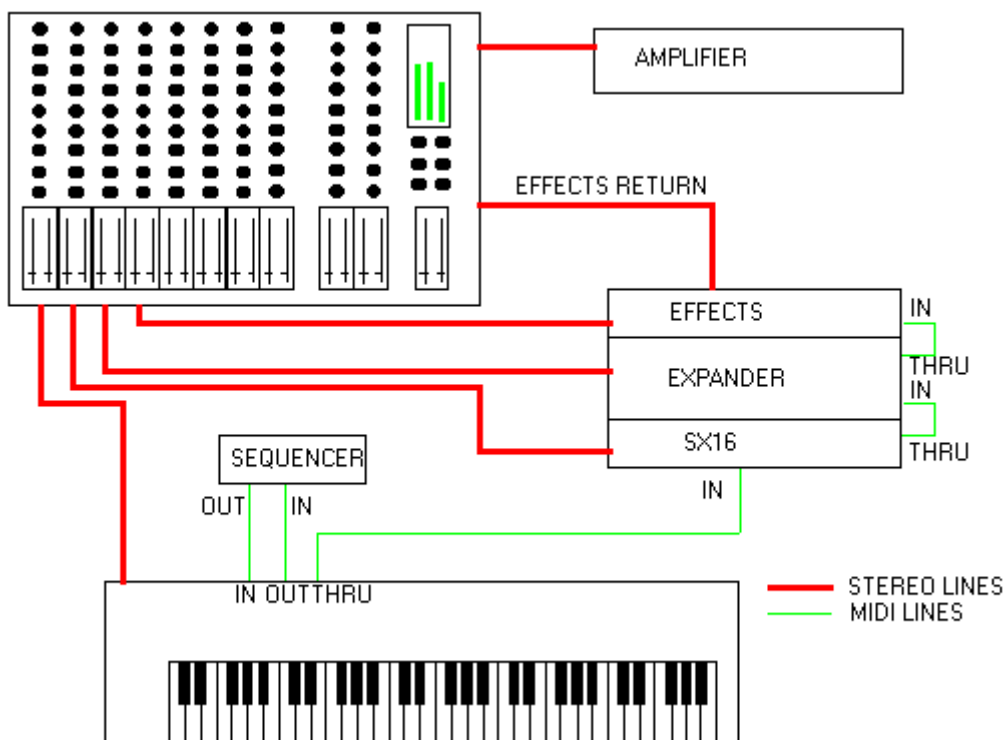
The SX-16 In A MIDI Network

The minimum requirement for connecting an SX so that the samples can actually be heard is a single ¼" jack cable connected from Output 1 to a mixer or amp input. In order to use the SX-16's potential, it is best employed in a MIDI sequenced network, such as that shown in the diagram below.

The Cheetah's MIDI input is derived from the sequencer with a soft-THRU, via a MIDI THRU chain. There has been an ongoing misbelief that it is not possible to MIDI THRU more than three devices, due to delays inherent within various instruments. This method has, however, been used most successfully on a MIDI THRU chain of seven devices, including the SX-16.

The Cheetah's audio outputs should, ideally, be connected via a mixing desk. This allows setting the volume of the samples via the desk, rather than having to change the samples' parameter settings. If you have spare channels, start to use the other outputs of the SX. This will allow mixing of separate samples, rather than mixing all samples on the same mixer channel. It will also allow the application of effects, if used, to individual samples.

If the Cheetah is to be used for sampling in this arrangement, it is desirable that the samples are taken directly from source, e.g., CD Player, Synth, etc.. This will eliminate any feedback problems when the input is taken from the mixing desk. The alternative is to reduce the gain into the desk for Output 1 (and 2 for a stereo sample).



Of course, this is not the only method for connecting MIDI instruments. Use of MIDI patchbays will greatly enhance the 'talkback' facilities of the instruments within the network. Likewise, the use of audio patchbays will enable the re-patching of audio leads in order that the outputs of various devices can be connected straight into the SX-16 for sampling, if necessary.

SX-16 Disc File Operations

Producing a sound with the SX-16 is fairly straight forward if it is assembled in a MIDI network as discussed although the memory in the SX-16 is non-volatile so it is necessary to load the required samples before playing. The following tutorial assumes that there is a valid, formatted, disk in the drive.

To load a sample from Disc:

Press the **LD/STRT** button.

This will cause the SX to access the drive in order to check the contents. The display will show the following message, with the name, and the size in kilo bytes, of the first sample on the disk shown in the upper half of the display:

```
SAMPLE1  243K
Load: choose
```

Pressing **ENTER** will cause the SX to load the sample shown in the display.

There are a number of various options available in the Load function:

< will scroll down through the samples on the disk.

> will scroll up through the samples on the disk.

<< or >> will cause the SX to re-access the disk. This is useful if the disk requires changing.

CNCL/BS will cancel the load procedure.

CLEAR will provide options for renaming and deleting files. It will produce the following, scrolling message:

```
1:Rename 2:Delete 3:Cancel
Press 1->3...
```

Pressing **1** will provide the following display, with the old name shown at the top, with space for the new name below:

```
Old: SAMPLE1
New: _SAMPLE1
```

Note that the SX will show the old sample name in the new sample name field. To delete press the **CNCL/BS** button. The SX-16 is now in alphanumeric input mode. All but two of the front buttons are now used to enter a text string for the name (up to 8 characters). Press **ENTER** when naming is complete and the SX will return to Load mode.

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Pressing **2** will cause the SX to ask for confirmation that the selected file can be deleted from the disk:

**Do you really want to delete disc file SAMPLE1 - 1:OK 2:Cancel
Press 1->2**

Pressing **1** will delete the selected file, and the SX will return to the load display.

Pressing **2** will cancel the delete, and the SX will return to the load display.

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Playing Samples with the Cheetah SX16

Once the sample is loaded (this can be a long wait, but the SX will inform as to how many milliseconds of the sample have been loaded), set the master keyboard to MIDI channel 1 and play. The SX will play the sample at whatever note is played. It will, however, in playing the sample, adjust the frequency of the sample as well as the pitch. This results in the sample playing slower or quicker as you play either side of the original pitch.

Alternatively, the sample may be played by using the **PLAY** button on the front of the SX. This will play the sample only as long as the button is pressed. Release the button and the sample stops playing. Playing the sample from the front panel will reflect any changes made to the sample since it was recorded, such as LFO or sample frequency. It will not, however, respond to any change made to the volume of the sample. The sample played from the front panel will retain its original recorded volume.

In addition to the **PLAY** button, there are two other buttons that can be used to play the sample:

Pressing **<** will cause the SX to play the sample backwards. Again, like the Play button, the sample will only play as long as the button is pressed. It is not possible to set a sample to play backwards through the SX's software or address this function via MIDI. Playing a sample backwards is only possible from this button and the sample played will be only that one selected in the SX-16's display.

Pressing **>** will put the SX in to SCRATCH PLAY mode. In this mode, it is possible to play the selected sample with the Pitch Bend Wheel on the controlling keyboard. Small movements of the wheel will cause large pitch changes in the sample, almost producing those devilish scratching sounds of a DJ. The technique does take a little practice, as the SX does not return the sample pitch to zero when the wheel is returned. The sample will only have its pitch reverse direction on getting opposite pitch bend messages, i.e., a +ve pitch change value will be required after a -ve value has been received to restore the pitch to its original setting.

Like the reverse sample play, scratch play is only available from the front panel and is not addressable via MIDI.

Pressing **>** again will exit Scratch Play mode.

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Sampling With The SX-16

In order to record a sample in the SX-16, it is first necessary to create the sample's identity and memory allocation within the SX.

Press the **SELECT** button (the display will change the lower half of the display to Choose).

Press either **NEW** to create a mono sample,

or, **NEW** to create a stereo sample.

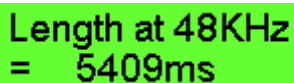
The SX-16's display will ask for the new sample's name:



Enter new name

The buttons on the SX are now be available for entering an alphanumeric name for the sample. Additionally the < or > buttons may also be used to fast scroll through the possible characters.

Once the name has been entered, press **ENTER**. The display will change to show the sampling frequency that the sample will be recorded at and, on the lower half of the display, the length of the sample:



Length at 48KHz
= __5409ms

The time shown will reflect all of the available memory remaining in the SX, taking into account the memory usage of the other samples already stored and the sampling frequency set by Parameters 3 or 22.

The displayed time can be cleared by using the **CNCL/BS** button. Pressing once will delete one character to the right, so that the example above would become 540ms. Pressing and holding the **CNCL/BS** button will clear each character rapidly. The numeric buttons can now be used to enter the required length. Alternatively, the cursor button can be used to change the length in single steps (by pressing the button once) or, more rapidly (by pressing and holding the button).

Pressing **ENTER** will end the process and the display will change to show the new sample as the currently selected sample:



SAMPLE1 1000
<unset>

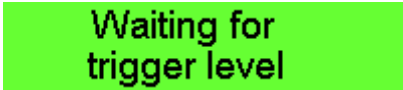
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The new sample is now, basically, a reserved area of memory for the recording.

Pressing the **SAMPLE** button will place the SX-16 into Monitor Mode. It will allow the monitoring, through the output(s), of the input to the sampler. If there is any audio activity the display will reflect this as the lower half of the display becomes a crude VU meter. Adjust the sample source's volume so that the peak level is approx. $\frac{3}{4}$ of the VU scale. Some sampling CD's have a reference tone included among the samples. If this is the case, play the reference tone first and adjust the CD output to suit. This will ensure that all of the samples taken will be at the same relative volume.

With the level set, press any button, except **CNCL/BS**, to start sampling in accordance with the Trigger Level set in Parameter 23. The default setting will mean that the SX will sample as soon as an input is received. This will be adequate for most sample sources, but if the source is noisy or has background sounds not required adjust the Trigger Level to suit.

The display will show the following message, until the sampling procedure starts:



Waiting for
trigger level

When the trigger level is reached, the SX will start to sample the input. The display will change to reflect this:



Sampling

When sampling is complete, the SX will return to normal mode, with the newly sampled sound shown as the selected sample.

The newly created sample will take the default values for all parameters, e.g.

Release Rate = 0
Original Pitch = C4
Sampling Frequency = as set
Velocity Response = 2
Aftertouch Response = 1
MIDI Channel = 1
Output Number = 1 for MONO samples, 1 & 2 for STEREO samples
Output Level = 100%
Transpose = 0
LFO Depth = 0%
LFO Rate = 1

At any time after pressing **SAMPLE**, the sampling procedure can be cancelled by pressing the **CNCL/BS** button. This will offer the option of abandoning the sample, or, continuing the sample operation. The display will change to:

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1:Cont 2:Abandon
Press 1->2

Pressing **1** will Put the SX into sampling mode, regardless of the state of the sample process when **CNCL/BS** was pressed.

Pressing **2** will return the SX to normal mode.

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Saving the Sample

Any sample in memory can be saved to floppy disc. It is also possible to save the entire contents of the SX-16, together with the system set-up.

To save a sample, press the **SV/END** button. this will produce the following display:

```
<unset>
Save: Choose
```

The **<** and **>** cursor buttons can be used to scroll through the samples held in memory. When the desired sample's name is shown in the upper half of the display, press **ENTER**. The SX will then start to save the sample. The message **Saving . . .** will appear, briefly, in the display followed by a running count informing of the number of milliseconds saved. On completion, the SX will return to normal mode.

Pressing the **<** button until the display reads ***** ALL ***** will indicate that the SX-16 will save all the samples held in memory as one file.

Pressing **ENTER** at this stage will prompt the SX-16 to ask for a name for the file. Again, the front panel buttons are available for alphanumeric entry.

Pressing **ENTER** will now cause the SX-16 to begin to save the samples. The display will now indicate the disc file's name as it is saved and will indicate the number of kilobytes saved:

```
*SONG1 498K
Saved 59K
```

When the operation is complete the SX will return to normal mode.

Note that the SX-16 will automatically add an asterisk to the beginning of the file name. This enables the differentiation between complete set-up files and individual sample saves.

If a sample that has been selected for saving is already on the disk then the SX-16 will offer the option to rename the sample. or overwrite the existing Disc file. The following message will be scrolled on the top half of the display:

```
SAMPLE1 is already on disc. Press New to try a new name, or Change to
re assignname (Old contents will be lost). -- 1:New 2:Change 3:Cancel
```

Pressing **1** will display a new screen that will prompt for a new name for the sample save. The cursor keys are now available for use for alphanumeric entry (see Sampling with the SX-16). Note that the sample's name will remain the same on the SX. Only the file name will be different.

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Pressing **2** will cause the SX to ask for confirmation that the sample can be saved by deleting the original file:

```
Do you really want to delete disc file SAMPLE1? -- 1:Ok 2:Cancel  
Press 1->2
```

Pressing **1** will cause the SX to rewrite the disc file with the new sample contents.

Pressing **2** will cancel the operation and return SX operation to the previous screen display, where, renaming or overwriting may take place.

Pressing **3** at this stage will cancel the save operation.

Using The SX-16's Internal Memory

The SX-16's precious memory can be filled very quickly with only one or two samples. Where possible use a lower sampling frequency. Halving the default sampling rate will, in effect, double the available memory and will still produce fairly good quality samples.

There is a generally considered rule that the sampling frequency should be twice the frequency of the highest frequency of the source sound and this is a valid rule of sampling when deciding at which frequency to sample. Like all rules, however, it is one that is open to interpretation. Sampling at a high frequency will not always guarantee a good result. A poor quality, or low frequency, sample sampled at high frequency will only really waste memory, it will not improve the quality of the original. In some circumstances, sampling at a lower frequency will actually improve an original sound where that sound is noisy. A good example of this is when sampling from Cassette, sampling at 24kHz can help reduce some of the hiss experienced on non-Dolby equipment.

Another way of conserving memory is to always truncate samples so that any blank areas in the reserved memory locations are freed for other use. Having 2 seconds of memory allocation for a sample that is only 1½ seconds long is, again, a waste of memory resources.

The SX-16 has a peculiar attitude to its memory allocation. Once a selection of samples have been loaded into memory, the memory for all of the samples is allocated even if they are truncated or deleted. This results in a hole in the memory that cannot be overwritten, even though a memory check on the SX will show all of the free memory including the hole.

If a new sample is created and the sample length equals the total memory free, the SX will give a really useful scrolling message, :

```
There is not enough contiguous space for the new sound: try deleting
an existing sound.
ENTER continues
```

This message is really informing that, yes, there is enough memory available for a sample of this length, but, that memory is not a continuous series of addresses, i.e., there are holes in the available memory. The holes can be filled again but only with a sample that is the same size, or less, as the hole. This will actually bring the deleted sample back into operation. The SX-16 will never actually delete a sample from memory, only its name. The only sure way of erasing a sample in memory is to sample over it!

Pressing **ENTER** will produce the message:<p>

```
Not enough room
```

Which is really indicating that the new sample is too large to fit into one, or more, of the holes.

This is actually not as bad as it at first appears but has two distinct advantages:

1) If a sample is accidentally deleted, it can be retrieved by creating a new sample of the same length (a sort of digital UNDO),

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2) None of the samples in memory are split across different areas of memory, but have their own dedicated series of continuous addresses. If the SX-16's memory is considered as a shelf of books and each sample is a book, then removing a book from the middle of the shelf will only allow another book of the same size to replace it. Removing the next book will allow a thicker book to replace the two. This process can be repeated across the whole bookshelf, the exception being the last book in the row. Removing the last book will allow a book the thickness of the remaining length of the shelf.

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SX-16 Parameters

Control of the SX-16's functions are controlled by two sets of parameters, those that affect the individual samples independent of other samples, and those that affect all samples or allow control of some of the SX-16's housekeeping functions.

The parameters are split into two groups, Sample Parameters and Global Parameters.

All parameters are selected for editing by using the front panel buttons. There are three ways of doing this:

- 1) Press the **PARAM** button.

This will cause the SX-16 to display:

```
SAMPLE1 1203  
Parameter _
```

The Parameter number can now be entered by pressing the appropriate, bottom row, numeric buttons and pressing ENTER.

The selected parameter will then be displayed for editing.

- 2) The second method again requires the **PARAM** button to be pressed. This will produce the same display as pressing **PARAM**. To set the parameter to the desired value press the cursor buttons until the value appears in the display. Press **ENTER**.

- 3) The third method dispenses with the **PARAM** button and simplifies the method to one of typing the appropriate parameter number(s) and then pressing **ENTER**. The SX will require that a sample is selected for this method to work for the Sample Parameters and, that a parameter is not already being edited.

If the display shows:

```
< Unset >  
< Unset >
```

this indicates that there is no sample selected and only the Global Parameters will be available for editing.

A sample shown in the lower half of the display is not a selected sample as far as Sample Parameters are concerned, unless it is one half of a stereo pair where the other half is selected in the upper display. For example:

```
SAMPLE1.L 2704  
SAMPLE1.R 2704
```

When a stereo sample is selected it is possible to switch the left and right channels between the upper and lower halves of the display by using the **ENTER** button. This will allow selection of each half of the stereo pair for editing those Sample Parameters that will not affect both samples. Either of the two samples of a stereo pair can be selected for editing those parameters that

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will affect both halves. The changes to one half will automatically be updated in the other half.

The steps to select a sample for editing are:

1 - Press the **SELECT** button.

This will cause the SX-16 to display the following message:

```
< Unset >  
Choose
```

2 - Use the < or > to scroll through the samples currently held in memory.

3 - When the name of the desired sample appears in the display press the **ENTER** button.

4 - The sample is now selected and its name is shown in the upper half of the display:

```
SAMPLE1 1203
```

The number shown to the right of the sample's name indicates the length of the sample expressed in milliseconds, a millisecond being 1/1000th of a second. In the example above, 1203 milliseconds is equal to 1.203 seconds. SAMPLE1 is, therefore, 1.203 seconds from start point to end point.

The sample parameters may now be selected for editing the set-up of the selected sample.

Most of the parameters have a single value as their setting. The exceptions to this rule are those Global parameters that have more than one function or setting, e.g., setting of keyboard split points or disk operations. Where a single value is presented then this can be changed by using the cursor keys or by entering the numerical value required.

Pressing < or > once will either increase or decrease the value by one.

Pressing << or >> will either increase or decrease the value by a larger amount, typically in steps of 10 or the next value in the available range.

Pressing and holding the cursor keys will allow rapid change in a parameters value. In all of the examples detailed for the Parameter sections, the change in values detailed will be the result of a single cursor button push.

When a parameter is being edited, it is possible to use two other keys on the front panel. These are the **CLEAR** and **CNCL/BS** buttons.

Pressing **CLEAR** will exit from the parameter setting without saving the changes.

Pressing **CNCL/BS** will delete one character to the left. Thus, 99 would become 9 if **CNCL/BS** is pressed.

The parameters are shown on the following pages, one parameter per page. The buttons required to select the parameter are also shown at the top of the page within the [] brackets.

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Sample Parameters

Parameter 1 - Release Rate 0

[PARAMETER, 1, ENTER]

Release Rate is defined as "the time taken for a sound to decrease to zero volume after a key has been released". The SX-16 allows the sample release rate to be either instant, never or gradual by using a 0 to 200 scale;

1 - sets the release rate to cut off the sample being played as soon as the key is released, i.e., a NOTE OFF is received.

2 - when set to this value, the sample plays to the end regardless of whether the key has been released, i.e., a NOTE OFF is ignored.

3 to 200 - when the release rate is set to any other number, then the SX-16 applies an envelope to the sample. This means that as a key is released the sample being played will gradually decay over time. Higher settings result in a faster decay time.

It is worth bearing in mind that this parameter will have no affect on samples when they are played via the PLAY button on the front of the SX-16. The release rate is dependant on the receiving of a NOTE OFF from a MIDI device.

Selection of this parameter will give the following display:

```
SAMPLE1      776  
Release Rate=__0
```

Pressing < will decrease the Release Rate by 1

Pressing > will increase the Release Rate by 1

Pressing << will decrease the Release Rate by larger amounts, typically steps of 10- 20

Pressing >> will increase the Release Rate by larger amounts, typically steps of 10- 20

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Parameter 2 - Original Pitch

[PARAMETER, 2, ENTER]

Parameter 2 is used to define the reference pitch of a sample. The SX-16 will assume that, if you set the original pitch parameter to middle 'c', then the sound that you are sampling is also at a pitch of middle 'c'. This setting is changeable after sampling, but may result in some tonal difference over an octave if the original sample was not at the same pitch as the reference set by this parameter.

The range of this setting is from C-1 to G9, a full nine and a half Octaves. It takes the form Note, Key reference. The display will also show the MIDI Note Number reference. Thus middle C is shown as Pitch: 60 (C4).

Selection of this parameter gives the following display:

```
SAMPLE1 776  
PITCH: 60(C4)
```

Pressing < will decrease the pitch by one semitone.

Pressing > will increase the pitch by one semitone.

Pressing << will decrease the pitch in larger steps, typically an Octave.

Pressing >> will increase the pitch in larger steps, typically an Octave.

Parameter 3 - Sampling Frequency 0

[PARAMETER, 3, ENTER]

When selected, this parameter will display the frequency at which the currently selected sample was originally made. The value can be changed both prior to and after sampling. It is possible to set this parameter from 1KHz to 99 KHz, although the SX-16 can only sample at one of seven frequency rates. The rate set by this parameter will actually be rounded up to one of these 'fixed' rates.

The Sampling Frequency refers to the number of times a second the SX will sample the sound input. The higher this rate, the better the reproduction of the sample is going to be. More importantly, the higher this rate, the more memory is used to store the sample.

Thus, a sample recorded at 24KHz will have 24,000 'samples' taken over one second. The same sample recorded at 48KHz will have 48,000 samples per second, utilising twice the memory.

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The available sampling frequencies are:

- 48KHz Above CD quality
- 32KHz Adequate for most requirements
- 24KHz Where a sound source contains more mid frequency components, a lower sample can be used, thus using less memory
- 16KHz Where a source contains more low-frequency components and clarity is not essential, a lower sample rate can be used
- 12KHz Useful for sampling vocal stabs etc.
- 8KHz The frequency at which telephone speech is sampled for use in Digital Telephone systems. Can add a grainy effect to vocal stabs
- 6KHz Useful for creating strange voices

Selection of this parameter will give the following display:

```
SAMPLE1 776  
S/freq.=32kHz
```

Pressing < will decrease the sampling Frequency by 1kHz.

Pressing > will increase the Sample Frequency by 1kHz.

Pressing << will decrease the Sample Frequency by larger amounts, typically 10-20kHz.

Pressing >> will increase the Sample Frequency by larger amounts, typically 10-20kHz.

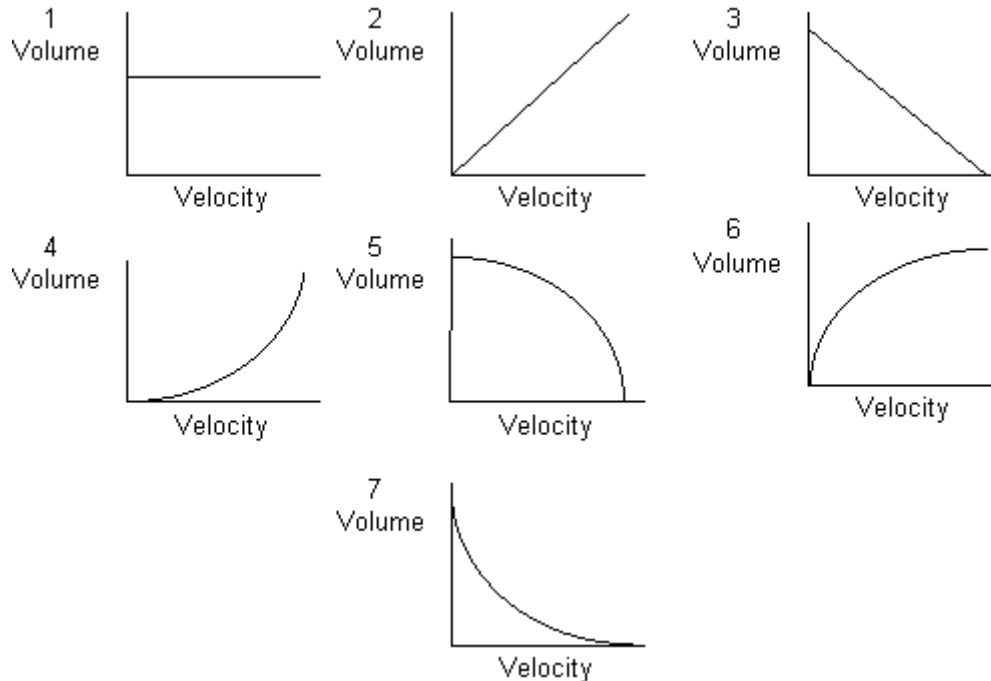
This parameter should not be confused by that set in Parameter 22, where the SX- 16's default sample frequency is set. Parameter 3 allows the setting of an individual samples frequency independently from the default both prior to and after sampling has taken place. Changing the frequency after sampling will, however, change the length of the sample.

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Parameter 4 - Velocity Response Curve

[PARAMETER, 4, ENTER]

This parameter determines how the selected sample will respond to MIDI Velocity Control Data from the controlling device, either a sequencer or an attached keyboard. There are seven 'curves' available that will affect how the volume of a sample changes in response to velocity data:<p>



Any one of these 'envelopes' may be assigned to each individual sample in memory. The default setting is 2 where the key velocity directly relates to the volume at which the sample will play back. As can be seen from the envelope graphs, above, it is possible to define differing relationships between the velocity of the key presses and sample volume. Thus, it is possible to have a sample respond loudly to gentle playing, or, softly to hard playing. Use of this facility will really depend on the usage of the sample. One application is to have two samples in memory, say, synth pads, where sample 1 has a loud volume for low velocity and sample 2 has a soft volume for low velocity. As the velocity of the key data increases Sample 1 becomes softer and Sample 2 becomes louder.

This is known as Velocity Cross Fading (or, Velocity X-fading). Interesting combinations of sounds can be created by using differing Velocity Curves.

Selecting this parameter will give the following display:

```
SAMPLE1 776  
Vel. Response 2
```

Pressing < will decrease the Velocity Response by 1

Pressing > will increase the Velocity Response by 1

Pressing << will set the Velocity Response to value=1

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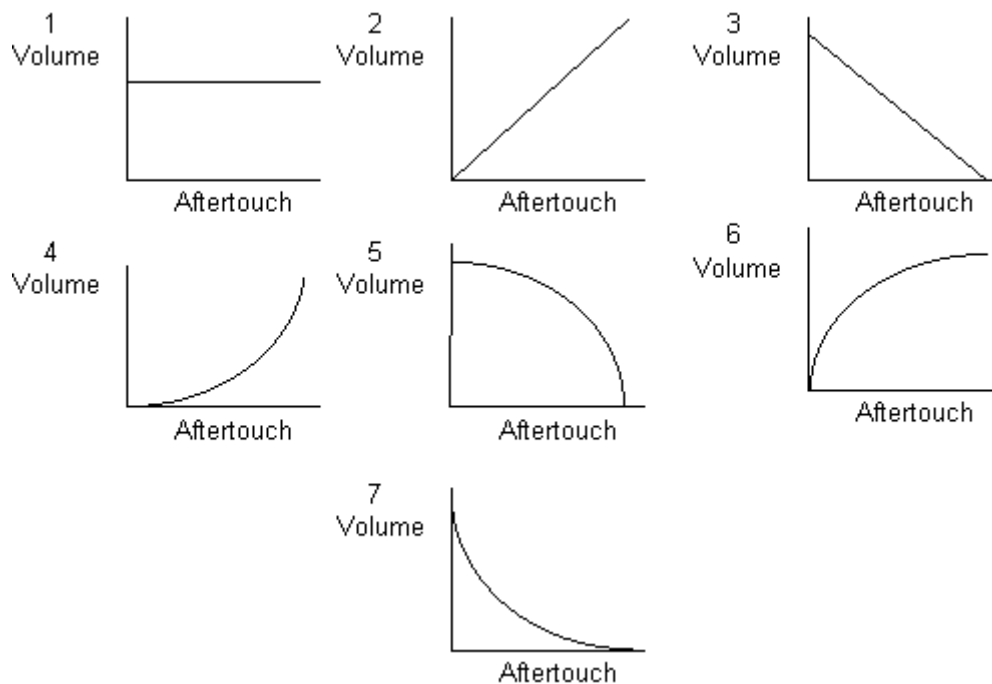
Pressing >> will set the Velocity Response to value=7

Parameter 5 - Aftertouch Response Curve

[PARAMETER, 5, ENTER]

Like the previous parameter, the Aftertouch Response Curve will determine how a particular sample will respond to MIDI information, in this case Velocity Aftertouch data.

The curves that are available are identical to those for Velocity Response so that it is possible to set similar sample X-fades using Aftertouch instead of, or as well as, velocity.



Selecting this parameter will give the following display:

```
SAMPLE1 776  
Aft.response 1
```

Pressing < will decrease the Aftertouch Response by 1

Pressing > will increase the Aftertouch Response by 1

Pressing << will set to the Aftertouch Response to value=1

Pressing >> will set the Aftertouch Response to value=7

Parameter 6 - MIDI Channel 0

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[PARAMETER, 6, ENTER]

This parameter will determine on which MIDI channel the selected sample will respond to MIDI information. A sample may be assigned to any of the 16 available MIDI channels. A sample may also be disconnected from MIDI control by setting the channel to 0. This is useful where a single sample has the same MIDI channel as the Split Keyboard function of the SX.

Any combination of samples can be assigned to a single MIDI channel so that it is possible to have all samples in memory assigned to the same MIDI channel, or, say, four samples assigned to channel 1 and 3 samples assigned to channel 5. Of course, your samples will only be played according to Midi mode and Polyphony as selected in Parameter 20. If the number of notes received is more than the allowed polyphony, then the first in, first out rule is applied, i.e, the earliest notes will be stopped as new notes take priority.

Selecting this parameter will produce the following display:

```
SAMPLE1 776  
MIDI Channel _1
```

Pressing < will decrease the Midi Channel by 1.

Pressing > will increase the MIDI channel by 1.

Pressing << will set the MIDI Channel to 0.

Pressing >> will set the MIDI Channel to 16.

Parameter 7 - Output Number

[PARAMETER, 7 ,ENTER]

As in the case of the MIDI channel, a sample, or combination of samples, may be assigned to any of the eight available Outputs. When a new sample is created it will automatically default to Output 1, in the case of MONO samples, or, Outputs 1 and 2 in the case of STEREO samples.

This parameter will allow reassignment of the selected sample's audio output. Note that a stereo sample will require two output channels, one for the left channel and one for the right channel. Setting both left and right samples to the same output will result in a mono sample! Selecting this parameter will produce the following display:

```
SAMPLE1 776  
OUTPUT 1
```

Pressing < will decrease the output number.

Pressing > will increase the output number.

Pressing << will set the output number to 1.

Pressing >> will set the output number to 8.

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Parameter 8 - Output Level

[PARAMETER, 8 ENTER]

Determines the output volume of the selected sample when the sample is played via MIDI. It has no effect on the volume of the sample when it is played via the PLAY button on the front panel.<p>

The volume range available is from 0 (min) to 100 (max.). Note that the maximum volume will be the volume at which the sample was recorded.

Selecting this parameter will produce the following display:

```
SAMPLE1 776  
Output Level 100
```

Pressing < will decrease the volume by 1.

Pressing > will increase the volume by 1, unless the setting is 100.

Pressing << will decrease the volume by large amounts, typically 10-20.

Pressing >> will increase the volume by large amounts, typically 10-20.

Parameter 9 - Tune

[PARAMETER, 9, ENTER]

The SX-16 allows for limited tuning of samples. There are two available functions:

- i) Global Tuning
- ii) Relative Tuning

Global tuning is used to tune the SX to external instruments. It allows fine tuning of the SX, hence all of the samples in the memory will be detuned by the same amount.

Relative tuning allows the tuning of an individual sample to a selected reference sample. The reference sample can be any one of the samples currently held in memory and any other of the samples may be selected for tuning against the reference.

The two types of tuning functions should be used in conjunction. The individual samples are firstly tuned to the reference tone, then the SX should be tuned to the external instrument. There is no possible method of tuning individual samples to external instruments unless the reference is tuned with the external instrument. The individual samples can then be tuned to the externally referenced reference. It is possible to fool the SX into tuning samples to external instruments by setting the reference as a drum loop. The sample can then be tuned externally rather than to the SX's reference.

To select a sample as the reference sample first make sure that it is the current selected sample, i.e., the sample's name appears in the upper half of the LCD display. Now press the **ENTER** key. The sample name will now change to

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the bottom half of the display and the upper half of the display will show `<unset>`. The sample shown in the bottom of the display becomes the reference sample and any other sample may be selected by using the usual method.

Selection of this parameter will give the following display:

```
SAMPLE1 776  
(Global tuning)
```

It will also cause the SX to play the indicated sample so that it may be heard with the reference instrument.

Tuning of the sample is performed by using the cursor buttons.

To tune a sample to a reference sample, first select the sample that is going to be reference, so that its name appears in the lower half of the display. Next, select the sampling that requires tuning so that its name appears in the upper half of the display. The display should now show:

```
SAMPLE1 776  
SAMPLE2 1037
```

Now select Parameter 9. The display will now show:

```
SAMPLE1 776  
(Rel. tuning)
```

Both samples will now be heard and the cursor buttons may now be used to tune SAMPLE1. Do not attempt this whilst the SX is receiving MIDI information as it will cause mayhem!

Pressing **ENTER** after tuning will return the SX to normal mode.

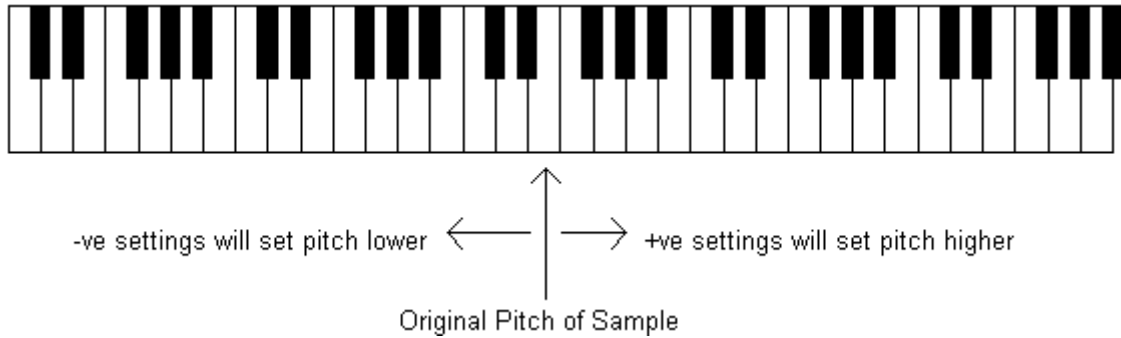
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Parameter 10 - Transpose

[PARAMETER, 10, ENTER]

The SX-16 allows transposition of samples over * 64 Semi-tones.

Positive settings will transpose the sample higher up the keyboard and negative settings will transpose the sample lower down the keyboard.



The Transpose facility on the SX-16 allows very coarse tuning of a sample but its primary use is to allow transposing of samples in order that keyboard splits can be configured, without having to change the split-key transpose (Parameter 26).

Selecting this parameter gives the following display:

```
SAMPLE1 776  
Transpose __0
```

Pressing < will Transpose the selected sample by minus 1 semi-tone

Pressing > will Transpose the selected sample by plus 1 semi-tone

Pressing << will Transpose the selected sample by larger negative amounts

Pressing >> will Transpose the selected sample by larger positive amounts

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Parameter 11 - Set Loop Points Ø

[PARAMETER, 11, ENTER]

The SX-16 allows for the setting of START and END loop points for each sample. Both start and end points can be at any part of the sample, but if they are both set to the same amount, then no sound will be heard.

To set the loop points requires the use of the **LD/START** and **SV/END** buttons as well as selection of the parameter.

Selection of this parameter will cause the SX to start playing the sample between the current loop points and give the following display:

```
SAMPLE1 776  
Loop set: Start
```

Pressing the **SV/END** button changes the display to:

```
SAMPLE1 776  
Loop set: End
```

It is now possible to 'toggle' between the start and end points of the current loop points and adjust the start/end using the cursor keys. As the SX does not give any indication of the start and end values, it is necessary to perform the loop edit by ear. Keys used for Loop Edit:

- < Adjusts the start or end point in small amounts towards the START of the sample
- > Adjusts the start or end point in small amounts towards the END of the sample
- << Adjusts the start or end point in large amounts towards the START of the sample
- >> Adjusts the start or end point in large amounts towards the END of the sample
- CLEAR** Resets the loop points to the positions they were at when parameter was selected
- ENTER** Saves the current loop points and exits
- CNCL/BS** Cancels loop point edit without saving

TIP:

In order to loop the whole of a sample it is necessary to make a small change in the loop points as the SX-16 will not loop a sample if no change is made before pressing **ENTER**. Pressing << once is enough to register the required change but not cause any discernible change to the looped sample.

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Parameter 12 - Truncate Sample 0

[PARAMETER, 12, ENTER]

The editing process of the SX is identical to that used by the Loop Edit parameter except that the Truncate Sample setting is destructive, i.e., moving the START or END point of the sample will result in a shorter sample, rather than a loop between the two points.

Selection of this parameter will start to play the sample over its full length and give the following display:

```
SAMPLE1 776  
Edit: Start
```

As in Loop Point edit, it is possible to 'toggle' between the start and end points using the **LD/START** and **SV/END** buttons. Pressing the **SV/END** button will change the display to:

```
SAMPLE1 776  
Edit: End
```

As in Loop Edit mode, the following keys are available for Sample Edit:

- < Adjusts the start or end point in small amounts towards the START of the sample
- > Adjusts the start or end point in small amounts towards the END of the sample
- << Adjusts the start or end point in large amounts towards the START of the sample
- >> Adjusts the start or end point in large amounts towards the END of the sample
- CLEAR** Resets the Sample Edit to the positions they were at when parameter was selected
- ENTER** Saves the current Sample Edit and exits
- CNCL/BS** Cancels Sample edit without saving

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Parameter 13 - LFO Depth

[PARAMETER, 13, ENTER]

Control of the SX-16's LFO, or Low Frequency Oscillator is performed by using Parameter 13, LFO Depth, in conjunction with Parameter 14, LFO Rate.

The LFO is essentially an amplitude modulator. Applied to a sample, it will cause the volume of the sample to vary in accordance with the LFO Depth and Rate settings.

The LFO Depth sets the amount of modulation to be applied. It can be applied in the range of 0% (no LFO applied) to 100% (amplitude modulation varying from full volume to zero volume).

Selection of this parameter will give the following display:

```
SAMPLE1 776  
LFO Depth=__0%
```

Pressing < will decrease the LFO Depth by 1%

Pressing > will increase the LFO Depth by 1%

Pressing >> will decrease the LFO Depth by larger amounts, typically 10-20%

Pressing >> will increase the LFO Depth by larger amounts, typically 10-20%

Parameter 14 - LFO Rate

[PARAMETER, 14, ENTER]

The LFO Rate determines the speed, or frequency, of the Low Frequency Oscillator. The value range for the LFO Rate is between 1 and 400, with each step equivalent to 0.1Hz. This allows for an oscillator frequency range of between 0.1Hz and 40Hz, in steps of 0.1Hz.

The LFO Rate setting needs to be used in conjunction with the preceding Parameter, LFO Depth. If the LFO Depth is set to 0, then changing the LFO Rate will have no effect on the sample. Selection of this parameter will give the following display:

```
SAMPLE1 776  
LFO Rate=__1
```

Pressing < will decrease the LFO Rate by 1

Pressing > will increase the LFO Rate by 1

Pressing << will decrease the LFO Rate by larger amounts, typically 10-20

Pressing >> will increase the LFO Rate by larger amounts, typically 10-20

Parameter 15 - MIDI Sample Dump Transmit

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[PARAMETER, 15, ENTER]

The SX-16 allows transmission of MIDI Sample Dump information to other remote devices. This can be any device capable of receiving MIDI Sample Dump Standard Ver 1.1.

The Cheetah manual recommends that the MIDI out of the receiving device be connected to the MIDI in of the SX whilst sample dump is performed. This is, however, only necessary if errors occur at the receiving end of the link due to MIDI Data not processing fast enough. Including the return path to the Cheetah will allow the receiving device to handshake it if it cannot process the incoming data quickly enough.

Selecting this parameter will perform the sample dump of the currently selected sample only and will produce the following display:

```
Remote sample  
number=_____
```

The remote sample number entered here will need to match the receiving device's sample number and will depend on where the sample is to be transmitted. The SX will not allow transmission to take place unless this number is specified.

Pressing **ENTER** will cause the display to change to:

```
Midi dump Tx  
in progress
```

After a short delay, the display will change to indicate the number of ms sent by the SX:

```
Midi dump Tx  
Sent 1000ms
```

The ms value will increment to show how much of the sample has been sent.

When complete the display will return to the normal display, with the sample name in the upper half of the display.

SX-16 Samples and Steinberg's Avalon

Steinberg's Sample Editor software works well with the SX-16. Samples can be dumped from the SX to Avalon under the MMA Standard, edited in the Time Domain Editor, and then retransmitted back to the SX. The MMA Standard MIDI dump is a notoriously slow process, but the processing available from Avalon makes it a worthwhile exercise for the SX-16.

Avalon is typical of a MIDI application requiring a closed loop of MIDI connections in order that it can process its data correctly. To this end the MIDI OUT of the SX should be connected to the MIDI IN of the ST and the MIDI OUT of the ST should be connected to the MIDI IN of the SX.

From the Atari desktop, double-click on the AVALON.PRG icon. This will load the Avalon desktop, a slightly different version to the Atari desktop, but the click, drag and point is the same.

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To set Avalon to receive a sample, drag the MMA Standard icon to the UNTITLED 1 icon. Avalon will display its Get Sample dump screen.

Set the MIDI Channel and Sample number. This will default to Channel 1, Sample 0001. The sample number will need to be incremented for each sample that is currently stored in one of Avalon's memory locations. If sample 0001 is already in memory then it will be overwritten by the new sample.

On the SX-16, select Parameter 15.

Enter the number of the sample to correspond with that set in Avalon by using either the numeric buttons or the > button to increment the value.

On the Avalon screen CLICK on START! Avalon will now wait for the sample information to be received at the set MIDI IN port.

On the SX-16, press **ENTER**.

The SX-16's Sample Dump process will then begin. If the MIDI connections between Avalon and SX are ok, Avalon will show an incrementing bar informing of the progress of the dump.

On completion Avalon will proudly display a dialogue box saying "Successful Sample Data Transfer". Click on OK and Avalon will return to its desktop. The SX-16 will return to its normal display. <p>

The sample is now located in BANK A1 of Avalon's memory (there are a total of four banks, each capable of storing eight samples). The UNTITLED 1 Icon will now be named MMA_SAMP 1 and it will display a small waveform to indicate that the memory area has data within it.

Double-click on this icon to access Avalon's Time Domain Editor.

When dumping stereo samples to Avalon it is important to bear in mind the absurdly short time-out set in Avalon (7 seconds!) if no MIDI data is received. If Avalon is told to expect a stereo sample it will firstly prompt for the Left channel, receive this data, then immediately prompt for the Right channel. There is now a seven second time window for the second sample to be selected on the SX-16, Parameter 15 to be selected and the sample number to be set. If both halves of a stereo sample are shown in the SX's display before a dump is performed then the key presses required in the required time will be **ENTER, 1, 5**, numeric buttons, **ENTER**, the first **ENTER** being required to swap between the two samples shown in the display. Note that the second sample in a stereo pair will have the same sample number as the first sample.

The seven second time-out will also apply when dumping a mono sample as Avalon will time-out seven seconds after clicking start.

Parameter 16 - Mirage Sample Dump Receive

[PARAMETER, 16, ENTER]

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As well as the ability to read Akai S900/1000 disks, the SX-16 has the ability to interact with another commercially available sampler, namely, the Ensoniq Mirage.

If you are the owner of a Mirage sampler, the SX-16 allows you to dump samples directly into its own memory in the same way as Standard Sample Dumps.

The MIDI IN of the SX-16 should be connected to the MIDI OUT of the Mirage, and vice versa. The Mirage will need to have been booted up with its MASOS disc.

The incoming sample data will be inserted into the memory area of the currently selected sample which will be over written. If you do not wish to over write a sample in memory, create a new sample of the required size for the Mirage sample.

Selection of this parameter will give the following display:

```
Mirage dump Rx  
Waiting . . .
```

Again, like the MIDI sample dump receive, the SX-16 will wait forever for the sample data to appear at its MIDI IN. To cancel the SX wait state press **CNCL/BS**. This produces the display:

```
1:Cont 2:Abandon  
Press 1->2 . . .
```

Press **1** to return to the wait state.

Press **2** to cancel the operation and return to normal mode.

Global Parameters

Parameter 20 - Midi Mode / Polyphony Mode

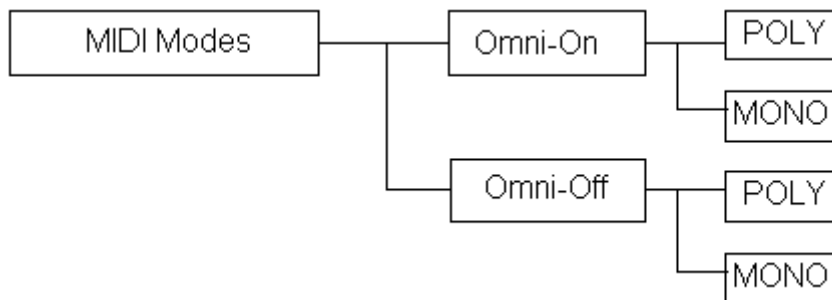
[PARAMETER, 2, 0, ENTER]

MIDI Modes

The MIDI mode of an instrument will determine how the instrument will assign the MIDI channels and the voices that it can produce.

There are four Mode commands - Monophonic, Polyphonic, OMNI on and OMNI off.

The monophonic (single-voice) and polyphonic (multi-voice) modes are mutually exclusive from one another, i.e., only one can be active as the opposite selection will be disabled. The OMNI messages are also mutually exclusive. This leads to a command structure as follows:



The OMNI messages determine whether the instrument will use channel separation. With OMNI-ON an instrument will respond to MIDI data on all 16 channels. With OMNI-OFF an instrument will only respond to MIDI data on its currently set MIDI receive channel.

With the increasing use of multi-timbral MIDI devices, MODE 3 is becoming the established standard for MIDI MODES. This enables each device to have its own dedicated MIDI channel for channel messages, eliminating the possibilities of instruments receiving data intended for a different device.

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The four Modes are defined as shown:

MODE	OMNI	FUNCTION
1	Poly On	Voice messages will be received on all channels and will be polyphonically assigned to instrument voices.
2	Mono On	Voice messages will be received on all channels and be monophonically assigned to instrument devices.
3	Poly Off	Voice messages will be received on the assigned channel and be polyphonically assigned to instrument voices.
4	Mono Off	Voice messages will be received on Channel n and assigned monophonically to voices

Midi modes and the SX-16

The SX-16 allows the setting of all four MIDI Modes. It will also allow the specification of the polyphony in the desired mode. In addition, there is also the facility to specify the polyphony of voices with or without filtering.

Selection of this parameter will give the following display:

```
Mode 3F 4 voice  
Poly Omni-off
```

This informs that the SX is set for MIDI Mode 3, with filtered 4 voice polyphony. The Polyphony value is changed using the << or >> cursor buttons. Pressing either button will scroll through the available polyphony options:

```
2 voice - filtered  
4 voice - filtered  
4 voice - unfiltered  
8 voice - unfiltered
```

The MIDI Mode can be changed by using the < or > cursor keys. Pressing either button will scroll through the MIDI Mode options. As the MIDI mode selection is changed, the lower half of the display will change to reflect the OMNI Mode description for the MIDI Mode, e.g.,:

```
Mode 2: 8 voice  
Mono Omni-on
```

This informs that the SX is set for Midi Mode 2, with unfiltered 8 voice polyphony. Note that the SX-16 cannot operate with 8 voice filtered polyphony.

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Parameter 21 - Clear System / Display Free Memory

[PARAMETER, 2, 1, ENTER]

Parameter 21 provides two functions for the SX's memory housekeeping.

CLEAR SYSTEM will reset the SX to the switch-on state, i.e., the system will be reset to default with all samples removed from memory. USE WITH CAUTION*

DISPLAY MEMORY FREE will display the amount of free memory available for new samples. Selection of this parameter will give the following, scrolling, display:

```
1:Reset 2:Display memory free  
Press 1->2 . . .
```

Pressing **1** will cause the SX to reset the memory and display the power on message with the available memory free.

Pressing **2** will cause the SX to display the power on message with the available memory free.

Pressing **CNCL/BS** will clear the memory display.

**NOTE:* The SX will not ask for confirmation when resetting the memory, so it is necessary to observe a little caution if Parameter 21 is selected purely to check the available memory free.

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Parameter 22 - Default Sample Frequency

[PARAMETER, 2, 2, ENTER]

The default Sample Frequency set here will determine the sampling frequency for all newly recorded samples. Once the sample has been taken, it's sample frequency can be individually set using Parameter 3, although the sample length will be changed in the transition. The sample frequency defined in parameter 3 can override the value set as default if it is set prior to the sample being recorded.

The available Sampling Frequencies are identical to those listed under Parameter 3. The higher the sample rate, the higher the reproduction of the sample is going to be. There is, however, a trade off that needs to be made between available memory and the quality of the sample. The better quality required, the more memory is required.

The available frequencies and the maximum sample time capable from a 512K SX are listed below:

FREQUENCY	MONO SAMPLE	STEREO SAMPLE
48KHz	5409ms	2704ms per ch.
32KHz	8114ms	4056ms per ch.
24KHz	16229ms	8113ms per ch.
12KHz	21639ms	10818ms per ch.
8KHz	32459ms	16227ms per ch.
6KHz	43279ms	21636ms per ch.

The time available, in milliseconds, is directly dependant on the Sampling Frequency used. Note that, the SX will treat stereo samples as two mono samples. This is reflected in the table above, in that the time shown for the stereo sample is half that of the mono sample, i.e., the table shows the time for one channel of a stereo pair.

Selection of this parameter will give the following display:

```
Default sample  
Freq.=48kHz
```

< or << will decrease the sample frequency to the next lower value.

> or >> will increase the sample frequency to the next higher value.

Note that the Default Sample Frequency can only be set to one of the 'fixed' frequencies as listed in the table above. It is therefore not possible to set the sample frequency below 6kHz or above 48kHz.

TIP: If stereo sampling is desired on an un-expanded SX, try setting the sample frequency to 24KHz. As the resulting samples will be in stereo the sound reproduction is that much better than a mono sample at the same frequency.

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Parameter 23 - Trigger Level

[PARAMETER, 2, 3, ENTER]

The Trigger Level is the controlling factor in deciding when the SX is to start sampling when sound is detected at the inputs when in monitor mode. The SX allows a sliding scale of Trigger Level based on a percentage of the incoming signal.

Setting the trigger Level to 0% tells the SX to begin sampling the moment a key is pressed whilst in monitor mode. Generally this will mean that the SX will start sampling, even if there is no audio input, thus memory will be wasted on a sample of nothing.

Setting the Trigger Level to any other value (1 to 100%) will cause the SX to wait until the audio input reaches the set value. Low values will cause the SX to start sampling as soon as an audio input is detected. The default setting is 4%, thus the SX will only start to sample when the input signal has reached 4% of the maximum input allowed (almost instantaneous).

It follows, therefore, that setting the Trigger Level to a higher value, will cause the SX to wait to start sampling until the corresponding signal level is reached.

Setting the Trigger Level to 100% will mean that the SX will wait to sample until the signal input reaches the maximum level.

Selecting this parameter will give the following display:

```
Trigger level
  =__4%
```

Pressing < will decrease the Trigger Level by 1%

Pressing > will increase the Trigger Level by 1%

Pressing << will decrease the Trigger Level by larger amounts, typically 10-20%

Pressing >> will increase the Trigger Level by larger amounts, typically 10-20%

Parameter 24 - Monitor Level

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[PARAMETER, 2, 4, ENTER]

The Monitor Level sets the volume of the SX when in monitor mode or when sampling. It has no effect on the recorded volume of the sample, only the monitor volume as it is recorded.

Like the Trigger Level, the Monitor Level is assignable across a 0 to 100% range, 100% being maximum volume. Selecting this parameter will give the following display:

```
Monitor level
=100%
```

Pressing < will decrease the Monitor Level by 1%

Pressing > will increase the Monitor Level by 1%

Pressing << will decrease the Monitor Level by larger amounts, typically 10-20%

Pressing >> will increase the Monitor Level by larger amounts, typically 10-20%

Parameter 25 - Pitch Wheel Scaling

[PARAMETER, 2, 5, ENTER]

Variable Pitch Bend can be programmed into the SX but not on a per sample basis.

The Pitch Bend may be set in the range 0 to 500 %, the 0% setting effectively disabling the SX's response to Pitch Bend information. Setting the Pitch Wheel Scaling to 100% will result in a pitch bend of approximately 1 octave.

Setting the Pitch wheel Scaling to 500% will result in large changes in pitch, with minimal movement of the pitch bend wheel being required to create large variations in pitch. This goes some way to achieving the SCRATCH mode of play from the front panel button. Selection of the parameter will give the following display:

```
P-Wheel Scaling
=100%
```

Pressing < will decrease the Pitch Wheel Scaling by 1%

Pressing > will increase the Pitch Wheel Scaling by 1%

Pressing << will decrease the Pitch Wheel Scaling by larger amounts, typically 10-20%

Pressing >> will increase the Pitch Wheel Scaling by larger amounts, typically 10-20%

Parameter 26 - Split Keyboard

[PARAMETER, 2, 6, ENTER]

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The Split Keyboard facility on the SX enables the user to map any sample currently held in memory to any key, or range of keys, on the controlling keyboard. Note that to configure keyboard splits, a keyboard (set on the SX's Split Channel) will need to be connected to the MIDI in of the SX in order that the mapping can be achieved. This is perfectly feasible via a THRU chain or via a patchbay.

Selecting this parameter will give the following display:

```
Split: display
```

In this mode, the SX will display the sample allocated to a particular key on the keyboard, when that key is pressed. It will not, however, display the key that was pressed:

```
SAMPLE1 0  
< Unset >
```

Pressing **ENTER** will change the display to read:

```
SAMPLE1 0  
Split: Choose 1
```

In this mode, the SX will wait until a key, or keys, is pressed on the keyboard and then assigns the currently selected sample, shown the upper half of the display, to that key(s). The display will indicate the key(s) allocated to the sample:

```
SAMPLE1 0  
Set on C4<
```

To map a sample to a range of keys, press and hold the first key in the range and then press the last key in the range:

```
SAMPLE1 0  
Set on C4-C5
```

Press **ENTER** and the display will offer the option to set a second sample to the same key range:<p>

```
Split: Choose 2  
< Unset >
```

The **<** and **>** buttons can be used to scroll through the samples in memory until the desired selection is found. When a stereo sample is mapped to a keyboard split, the Choose: 2 option will display the RIGHT channel of the stereo pair. Pressing **ENTER** will return the display to Split: Display mode. If a second sample is not required press **ENTER** when **< Unset >** is displayed. Further samples may be assigned to other keys using the same method.

To return to normal mode press **CNCL/BKSP**. All keyboard split assignments are now saved.

Parameter 26 - Split Keyboard Key Transpose

Whilst in Keyboard Split mode, it is also possible to apply transposition to the selected sample. Whilst the SX is showing Split: Choose 1 it is possible

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to use the cursor keys to change the transposition of the selected sample. The sample can then be mapped to the keyboard using the new transpose value:

Pressing < will Transpose the sample by minus 1 semi-tone

Pressing > will Transpose the sample by plus 1 semi-tone

This function is only applicable to a sample when it is mapped in a keyboard split. It is independent of the transpose setting of Parameter 10.

The range of transposition available in Split mode is * 32 Semi-tones.

The display will update to reflect the changes made:

```
SAMPLE1 -1  
Split: Choose 1
```

NOTE: The transpose setting must be set before the sample is mapped as the SX will keep the last setting that the split was saved with until the keys are reprogrammed.

Now, when the SX is in Split: Display mode and a key is pressed the new transpose value will register:

```
SAMPLE1 -1  
< Unset >
```

Parameter 27 - Split Keyboard Channel

[PARAMETER, 2, 7, ENTER]

This parameter will determine the MIDI channel for the keyboard split defined in Parameter 26. It is independent of the individual MIDI channel set in Parameter 6, but, if an individual sample has the same channel as the keyboard split channel, then this sample will also be played if MIDI note information is received on the channel. Set the individual sample's MIDI channel to 0 if this is the case.

All samples that are set in the keyboard split will respond to MIDI information on the split channel irrespective of the channel set in Parameter 6.

Selection of this parameter will give the following display:

```
Split channel _0
```

Pressing < will decrease the Midi Channel by 1.

Pressing > will increase the MIDI channel by 1.

Pressing << will set the MIDI Channel to 0.

Pressing >> will set the MIDI Channel to 16.

Parameter 28 -Basic MIDI Channel

[PARAMETER, 2, 8, ENTER]

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This allows the setting of the basic MIDI channel of the SX-16. Primarily this specifies the channel on which the SX will respond to MODE changes.

The channel will need to be set in accordance with the Mode settings in Parameter 20.

Selection of this parameter will give the following display:

```
Basic channel _1
```

Unlike the previous MIDI channel parameters, it is not possible to disable this channel setting. The range of possible choices is therefore from 1 to 16.

Pressing < will decrease the Midi Channel by 1.

Pressing > will increase the MIDI channel by 1.

Pressing << will set the MIDI Channel to 1.

Pressing >> will set the MIDI Channel to 16.

Parameter 29 - MIDI Number Of Voices

[PARAMETER, 2, 9, ENTER]

When the SX is used in MIDI mono modes, it is possible to use this parameter to specify the 'M' number.

The 'M' number is specified in the MIDI voice message as the count of the number of channels. The value of 'M' is a number between 1 and 16. The channel that messages will use will be calculated from the formula $n=n+m-1$, where n refers to the basic MIDI channel.

Setting the 'M' number will determine how many channels are available for use by incoming MIDI messages.

Selection of this parameter will give the following display:

```
Number of voices  
M=16
```

Pressing < will decrease the M number by 1.

Pressing > will increase the M number by 1.

Pressing << will set the M number to 1.

Pressing >> will set the M number to 16.

Parameter 30 - Format Disk

[PARAMETER, 3, 0, ENTER]

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The SX's Disk Format procedure is rather long-winded. Not only does a disk require formatting, but it also requires initialising, a name and a sequence number. The standard SX-16 is delivered with a Double Density 3½" Disk Drive. An optional High Density drive is also available so the type of disk needs to be specified before formatting.

Selection of this parameter will cause the SX to access the disc drive to assess the status of the Disk. For a previously un-formatted Disk the SX will, after a short delay, display the following (scrolling) message:

```
This disk must be formatted before it can be used.  
( or try another disk ) --1: Format 2: Retry 3: Cancel
```

(this message all appears on the top half of the display)

The lower half of the display will continue to display the following message whilst the top line is scrolling:

```
Press 1>3 . . .
```

It is not necessary to wait until the message has stopped scrolling before entering a selection.

Pressing **1** will cause the SX to start the formatting procedure.

Pressing **2** will cause the SX to attempt to read the disk again.

Pressing **3** will cancel the format operation.

The Format Procedure

Selecting option 1 will present another scrolling message asking for the Disk's density format:

```
Select density -- 1: Norm 2: High
```

The lower half of the display will continue to display the following message whilst the top line is scrolling:

```
Press 1-> 2
```

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Again, it is not necessary to wait for the scrolling message to finish before entering the selection. Pressing **1** or **2** to specify the density will cause the SX to start formatting. The display will change to inform that the formatting procedure is working:

```
Format DDDS80
Track 10, side 1
```

The display will update to give an indication of the progress of the format:

```
Format DDDS80
Track 20, side 2
```

When completed the SX will ask for the Disk name:

```
Disc name:
-----
```

Use the number/letter buttons to specify a name and press **ENTER**. The SX will now ask for a sequence number. It is important that for large sample saves, i.e., larger than 760K, sequence numbers are used so that the SX can re-load the information at a later date. If an unexpanded SX is being used then the sequence number can be left at default. Pressing **ENTER** will produce the following scrolling display:

```
Disc initialised. 720K available.
```

The lower half of the display will continue to display the following message whilst the top line is scrolling:

```
ENTER continues
```

Pressing **ENTER** returns to the normal display.

If the Disk in the drive is already formatted, the SX-16 will produce a corresponding, again scrolling, message:

```
This disc is already initialised -- 1: Init 2: Format 3: Cancel
```

The lower half of the display will continue to display the following message whilst the top line is scrolling:

```
Press 1->3 . . .
```

Pressing **1** will cause the SX to re-initialise the disc. The SX will request the Disc name and sequence number.

Pressing **2** will cause the SX to start the formatting procedure. Note the SX will not ask for the Disc density when starting to format.

Pressing **3** will cancel the format operation.

Needless to say, the above procedure relies on there being a disc in the drive. If no disc has been inserted the SX-16 will still try the format procedure. It will actually respond with a write protect error, and ask for the write protect to be removed before continuing!

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Atari ST Disc Compatibility

Perhaps one of the most useful functions of the SX-16. The Disc format used by the SX is compatible with that of the Atari ST. This means that Disc formatting can be performed on the ST, instead of using the laborious SX method. The discs will still require initialising for use with the SX but as this is a fairly simple task, it is not a problem and, as the SX will inform if a disc requires initialising there is only a need to initialise when saving sample files.

Note that, although the SX-16 has disk format capability with the ST, it uses a different FAT table on the disc. Subsequently, the ST cannot read the files from a SX Disc.

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Parameter 31 - MIDI Sample Dump Receive

[PARAMETER, 3, 1, ENTER]

As well as having the facility to transmit MIDI Sample Data, the SX-16 can also receive the same MIDI dump information in the Ver 1.1 format.

Selecting the MIDI sample Dump receive will prompt the SX to ask for the incoming samples' name and its sample number. Selection of this parameter will give the following display:

```
Enter new name
```

Use the character buttons to name the sample and then press **ENTER**. The display will change to:

```
SAMPLE1  
Sample num: ____0
```

Use the cursor to change the number to the desired value. The sample number can be any number from 0 to 9999, and will need to match the sample number of the sample in the remote device.

Pressing **ENTER** will set the SX-16 into wait mode, i.e., it is waiting to receive MIDI Sample Dump information. The display will now show:

```
MIDI dump Rx 00  
Waiting . . .
```

The SX-16 will wait for whatever length of time is necessary to receive the sample dump. This is ideal in the for instance whereby problems are experienced in transferring the sample as it will not be necessary to keep re-setting the SX-16's 'wait state'.

If it is necessary to cancel the SX's wait state press the **CNCL/BS** button. This will cause the SX to display:

```
1: Cont 2:Abandon  
Press 1->2 . . .
```

Pressing **1** will return the SX to sample wait mode.

Pressing **2** will return the SX to normal mode.

Sample Dump From Avalon

On the SX-16 select Parameter 31, enter the new sample's name and set the sample number to match the number of the sample in Avalon. Press **ENTER** and the SX-16 will wait for the MIDI information.

On the Avalon desktop, drag the desired sample to the MMA Standard Sampler Icon. Avalon will now display its Send Sample Data dialogue box. Check that the sample number is correct for the SX-16 setting and CLICK on START!. Note that Avalon also has the seven second time-out as discussed previously in downloading to Avalon.

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Parameter 32 - MIDI Sample Dump Channel

[PARAMETER, 3, 2, ENTER]

This parameter allows setting of the Midi Sample Dump Channel. It requires to be set in accordance with the channels set on the remote sampler.

The default channel is Channel 0, although it is possible to set this value anywhere in the range between 0 and 127.

Selection of this parameter will give the following display:

```
Dump channel __0
```

Pressing < will decrease the MIDI Channel by 1.

Pressing > will increase the MIDI Channel by 1.

Pressing << will decrease the MIDI Channel by larger amounts, typically 10-20.

Pressing >> will increase the MIDI channel by larger amounts, typically 10-20.

Parameter 33 - MIDI Features

[PARAMETER, 3, 3, ENTER]

There are three available functions that allow setting of the SX-16's response to MIDI information. These functions are:

1. Control Change
2. Program Change
3. System Exclusive

Each function can be on or off.

Control Change determines whether the SX will respond to MIDI Controller information.

Program Change determines the response of the SX to Program change information. If selected the SX will play the sample associated with the Program Change number. PG 0 will select Sample 1, PG 1 will select sample 2, etc.. It will also solo that particular voice on its selected MIDI channel. If there is more than one sample on a MIDI channel, then only the sample corresponding to the last Program Change will be played. Suffice to say, Program Change numbers above the number of samples in memory will be ignored, i.e., if 5 samples are currently held in memory, Program Change 5 and above will be ignored.

System Exclusive determines whether the SX will respond to MIDI Sample Dump requests from other instruments. If set to OFF, the SX will refuse dump requests. If problems are experienced in Sample Dump requests check that SysEx is ON.

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Selection of this parameter will give the following display, initially showing the Control feature:<p>

```
MIDI features:  
Control: Off
```

The < and > cursor keys are used to toggle the setting ON or OFF.

Pressing ENTER will display the Program Change message:

```
MIDI features:  
Prog.change: Off
```

The < and > cursor keys are used to toggle the setting ON or OFF.

Pressing ENTER will display the System Exclusive message:

```
MIDI features  
Sys. Excl.: On
```

The < and > cursor keys are used to toggle the setting ON or OFF.

Pressing **ENTER** will return the SX to normal mode.

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Parameter 34 - MIDI Program Change Transmit

[PARAMETER, 3, 4, ENTER]

Selecting this parameter allows the transmission of a MIDI Program Change message from the SX-16.

When selected the SX will ask for the MIDI channel that the Program Change will use. This will need to match the receive channel of the connecting device. The receiving device will also need to have its MIDI settings reflect that it will receive Program Change messages.

When prompted, specify the Program Change number to be sent. This number will need to match the corresponding Program Change number on the receiving device. Be aware, however, that not all MIDI manufacturers follow the same Program Change numbering system (see SX Program Change).

Selection of this parameter will give the following display:

```
MIDI prog change  
Ch. __ to
```

Pressing < will increase the MIDI channel by 1.

Pressing > will increase the MIDI Channel by 1.

Pressing << will set the MIDI Channel to 1.

Pressing >> will set the MIDI channel to 16.

Pressing **ENTER** will move the cursor to the Program Change number field:

```
MIDI prog change  
Ch. 1 to ____
```

Enter here the Program Change number required to select the desired program on the receiving device. Program numbers from 0 to 127 are permissible.

Pressing < will decrease the Program Change number by 1.

Pressing > will increase the Program Change number by 1.

Pressing << will decrease the Program Change number by larger amounts, typically 10-20.

Pressing >> will increase the Program Change number by larger amounts, typically 10-20.

After entering the desired selections press enter to send the Program Change message. The SX will return to normal mode at the same time.

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Parameter 36 - MIDI Out On/Off

[PARAMETER, 3, 6, ENTER]

Undocumented in my SX manual, Parameter 36, allows the SX MIDI output to be switched off.

Selection of this parameter will give the following display:

MIDI out: On

Pressing the < or > cursor buttons will toggle the MIDI out ON/OFF.

Parameter 37 - Repeated Note Duplication

[PARAMETER, 3, 7, ENTER]

Parameter 37 allows the setting of the SX-16's response to MIDI note messages when they are received on the same note and channel as another already playing note.

With Repeat Duplication OFF, the SX will stop playing the first note and begin to play the new note immediately instead. This is not normally a problem with longer samples, but with short samples this can cause an audible clicking as the first note is cut off. With very short samples containing more low frequency components Repeat Duplication will not eliminate sample click. The click is due to the SX-16 switching quickly between stopping the first note and starting the new note. It is not a problem with the SX but is due to circuits not switching quickly enough (even some Akai samplers will give the same click on transition).

When Repeat Duplication is set to ON, the current note will be played to its end when new note information is received. Consequently both notes will play simultaneously at some point. As the new note's sample is played to its end it should have a cleaner ending. If the sample clicks at the start then setting this parameter will have no effect.

Selection of this parameter will give the following display:

Repeat dupl: Off

Pressing the < or > cursor buttons will toggle Repeat Note Duplication ON/OFF.

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Author's Note:

This document is derived from an archive of an HTML-ized version of The Cheetah Cheater, a manual I originally wrote and sold in 1993. At the time I felt it was needed as the original manual from Cheetah was really poor IMO. From memory I think it was about 20 pages long and didn't really explain much about the sampler's operation.

It was originally written using Pagestream on the Atari ST and I paid about £150 to have 100 hundred copies made in my employer's print shop. It ended up with a nice red cover on which, for some reason, I replaced Cheetah's Cheetah logo with a speeding rabbit. No idea why, it just seemed appropriate at the time.

I sold about 25 copies with which I included a disc containing about a dozen samples so with the cost of production, plus the cost of the discs I just about made my money back. Obviously, I had hoped to sell more as I'd read somewhere that there 15,000 of these units about but after speaking to Cheetah about it at the time, that figure was quoted at actually 1500. I kept what was left of the copies I had for about 10 years then sent them for re-cycling after a clear out, so apart from my main copy (still in the attic somewhere), I'm not sure if many remain. If you have one, you never know, it could be worth about a tenner by now;-)

I also send a couple of copies to Sound on Sound and Future Music, who gave it 9/10, which pleased me no end. I'll add their review to the end of this document when I find the issue it was in. It's bound to be in the attic somewhere!

Looking back at this, I notice that there are a couple of things I missed - The MIDI implementation and the Control Messages being the main ones - and my really simple explanation of sampling now seems a bit lacking, but it is what it is/was. I've not changed any of the text (except to correct some 25 year old spelling mistakes) and the images are also the original ones I did using Degas, I think, again on the Atari.

Hopefully anyone still using one of these beasts finds this useful. I do see it mentioned on E-bay sales of the SX-16 which is nice in that it's still remembered.

This version is now hosted on my Aira website, where you see can my musings on a whole bunch of products which also came with naff manuals. Mmmm, I see a pattern here, tho' TBH, I'm not sure what I've been doing for the 20-odd years in between!

Cheers

Nig