

Sample-X

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Chapter 1

Sample-X

1.1 Online help for Sample-X

Sample-X

Demo Version 2.6

A MIDI driven sample
player for the Amiga

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1.2 Disclaimer

NO WARRANTY

The author cannot be held responsible for any loss of data or damage which occurs from directly or indirectly use of this program. The user understands this declaration prior to installing this program on an Amiga computer system.

1.3 Author's welcome

Sample-X is a MIDI driven sample player for the Amiga. It is a sound engine which is triggered by controllers such as

- external devices: a MIDI master keyboard or sequencer connected to the serial port of the Amiga
- internal programs: MIDI utility programs (Arp, drumPad) or sequencers (Bars&Pipes, Music-X).

Sample-X is not a tracker. It was written from scratch with MIDI control in mind. Therefore, its layout is typical of a multitimbral MIDI synthesizer capable of playing different sounds on its sixteen channels. Of course, you need to see the 'features' section to discover the full functionality of Sample-X.

Sample-X was initially conceived because I was frustrated by the limited sample handling of Music-X. Now that's no longer a problem. I use Music-X to sequence MIDI data and Sample-X to provide sophisticated sample playback functions. Through Sample-X, it's possible to achieve real-time volume/pan change, direct from disk play and delay effects. So I'm no longer limited to the sounds produced by my MIDI synths. I can use any samples my Amiga can play.

Well it's 1999 and the Amiga is still going strong. It's a reflection of the amazing power of the (now) classic Amiga. Hence, I'm still developing Sample-X which gets better with every revision. This new version has had a massive GUI overhaul and a complete internal structure rewrite. The result is a more intuitive and faster response sample player.

With the appearance of reasonably priced 16bit soundcards for the Amiga (1200), this machine has finally matured and moved into the field of producing (CD) quality audio. Now Sample-X (with AHI) can really demonstrate the audio capabilities of the Amiga.

Happy sampling and sequencing.

1-6-99

1.4 System requirements

Sample-X requires

- Workbench 2.04+
- AHI

Optional items are

- MIDI interface, external keyboard/sequencer
- Internal sequencer (Music-X/Bars&Pipes)
- midi.library, camd.library
- amigaguide.library

The AHI device is used to play sample data on your Amiga. Make sure you obtain at least version 4.5 of the paula.audio if you want to use the Amiga's internal sound. I don't have a third-party soundcard so I've been unable to test Sample-X with say Delfina, Toccata, Prelude. Could others please let me so that I can produce a help section in this documentation which would assist others.

To turn your Amiga into a stand alone MIDI sample player, some external MIDI device such as a hardware sequencer (eg another computer) or master keyboard is required. Naturally, a MIDI interface is a must.

Possession of the midi.library or camd.library is useful if you want Sample-X to take MIDI data output from another program (see the DrumPad example). However, neither library is essential to operate Sample-X.

The amigaguide.library is required for the on-line help. This library is standard in Workbench OS3.0+.

While Sample-X should run on all Amigas, I don't know how well it will run on a 7MHz A500. It does put a fair bit of demand on the CPU and a 68000 might not be able to keep up. But try it and see. Even my machine is a bit behind the times and I'd recommend an '060 equipped Amiga to get the best out of Sample-X.

Furthermore, please see the
 problem~page
 if you are experiencing problems
with Sample-X.

1.5 Features

Sample-X is a sample player for the Amiga computer. It was created ↔ for the sole purpose of replacing the sample player in the Music-X system, but it can also serve as a MIDI driven sample player. For this purpose an external sequencer or MIDI keyboard is required to send MIDI commands to Sample-X.

Features

- AHI based
- 16 MIDI channels
- 32 polyphony
- Mono, stereo samples
- Wave samples
- No CHIP RAM limit on samples
- Direct from hard disk play
- Reverse sample play, delay FX
- Raw sample configuring
- Sample replace feature
- Loads IFF/WAV/AIFF formats
- Sample priority scheme
- Multiple samples per MIDI channel
- Save MIDI channel setups
- Save Session setups
- Volume envelope
- Wave envelope
- Extensive MIDI control to give
 - Real-time panning/Sample cross-fading
 - Real-time pitch-bend
 - Wave manipulation (filter emulation)
 - Quick disk sample trigger
 - DJ loop mode
- Works with AHI aware soundcards
(Internal Paula audio, Delfina, Toccata, Prelude, etc)
- Drivers for
 - Music-X
 - Bars&Pipes
 - internal serial port (and other third party serial cards)
 - CAMD interfacing
 - midi.library interface (see Drumpad demo)

Enhancements for v2.6

- Complete code rewrite
 - Drag'n'drop feature
 - Revised GUI display (public screen)
 - Revised sound engine
 - Revised MIDI drivers
 - Dynamic screen change/palette change
 - Dynamic audio mode change
 - File query option
 - On-screen note player
 - DCA (Dynamic channel allocation)
-

- Sample morphing
- Arexx interface (not functional)

Future plans

- 68030/040/060 versions
- Basic sample editing
- Sample layering, velocity offset trigger

This is a demo version of Sample-X. It is possible to save samples and user preferences. However, there is no saving of channel set-ups nor set-up set-ups. See

Registration
on how to obtain the full version.

See the

About~Sample-X
for the most important parts of Sample-X.

1.6 Glossary

Some important terms appearing in documentation.

AHI System

Assignment

The act of linking a sample to a MIDI channel so that MIDI messages (eg from an external keyboard) will then trigger that sample at different pitches.

Audio channel

Refers to one of the 32 sound channels used by Sample-X (via AHI).

Channel (Sample-X)

MIDI Driver

These are used by Sample-X to receive MIDI data from the outside world. The outside world refers to other programs running on the Amiga, such as Music-X and Bars&Pipes, as well as external devices, eg MIDI master keyboards, sequencers, etc

Sample-X has two external drivers

xphantom: links Music-X to Sample-X
sx1k.ptool: links Bars&Pipes to Sample-X

and three internal drivers

xmidi: links Sample-X to midi.library, programs, serial port
xcamd: links Sample-X to camd.library, programs, serial port

xraw: (raw serial port MIDI driver), links Sample-X to serial.device, hyperCOM1.device, etc

MIDI

Musical Instrument Digital Interface. A protocol used between hardware units for the transfer of notes and other messages relating to musical information. It's quite a few years old now, but it's definitely a standard!

MIDI channel

This is one of the sixteen lines on which notes can be transmitted. Each line has a note span of 128 notes or different pitches and each line has its own parameters such as volume, panning and pitch-bend.

Monophonic (MIDI)

Only one note from a MIDI channel can sound at one time. This action is similar to a trumpet or flute playing.

Mono or monophonic (audio)

Refers to the reproduction of sound through one transducer channel (eg a loudspeaker). This is typical on small wireless units.

Panning

The moving of a sample in a stereo field so that the sound appears to emanate from a particular location such as the far-left, far-right or just right of the centre.

Polyphonic (MIDI)

A mode in which two or more notes from the same MIDI channel can be played simultaneously. This behaviour is similar to a guitar or piano. Sample-X can play up to 32 samples simultaneously.

Sample

Session/Setup (Sample-X)

This is the whole set-up of data within Sample-X at any point in time. It contains the information relating to the all the loaded samples, their configuration on the MIDI channels as well as the channel specific stuff like volume and panning. It is possible to save a snapshot of this data to file for use at a later date. Therefore there is no need to load samples and configure channels each time Sample-X is loaded.

Stereo (audio)

Refers to the reproduction of sound through two transducer channels. This set-up is demonstrated in hi-fi systems. The noticeable difference from a monophonic sound is the added realism resulting from the ability to locate certain sounds in 2D/3D space. This also reflects how the human being perceives sound with his two ears.

Wave (sample)

A wave sample is composed of two or more waveforms which may or may not bear some resemblance to each other. Only one of the waveforms is played at any one time. It is useful for creating filter sweeps. Filter operations are at the heart of synthesizer music, and unfortunately, the Amiga sound circuitry) is not capable of it. Check out the demos on employing wave sequences.

1.7 About Sample-X

The following section provides an overview of important aspects ←
about

Sample-X.

About Sample-X

MIDI interface

Sample-X works like any multi-timbral, polyphonic MIDI device with some standard features for control over note velocity, channel panning, pitch-bend, etc. However, it also has some unique features such as wave type samples, sample priority and direct-from-disk play. Like a MIDI device, Sample-X is operated by another MIDI device, which can be a master keyboard or sequencer.

External programs, such as the xphantom driver for Music-X and the sxlk.ptool for Bars&Pipes, communicate with Sample-X through a standard protocol. They thus send MIDI data to Sample-X and do not wait for a reply (similar to real MIDI devices). This allows them to output their data at the correct time even though Sample-X may lag behind.

Sound interface

Using the AHI system allows Sample-X to play 32 sounds simultaneously. Each sound can be a mono sample or a stereo sample.

Envelopes

The Exiff format

Sample-X uses its own sample format because the Standard IFF specification is a bit limited. The Exiff therefore caters for direct-from-disk play, wave samples and realtime volume/wave envelope.

Sample-X can handle two sample types: RAM samples and DISK samples. Each one has the following features.

L - looped	W - wave type
M - mono	S - stereo

RAM	- L, W, M, S
DISK	- M, S

RAM

This sample type is identical to that handled by other Amiga audio programs. Samples of this type are loaded into Chip or Fast RAM. They can be of any length so long as there is available memory space.

DISK

Small (64K) buffers are allocated for disk samples. The data are spooled regularly from the hard drive. There is always an initial delay when disk samples are triggered because of the seek required to get to the correct start point. Therefore disk samples will have to be started a bit earlier than their RAM counterparts. Alternatively, you can use the special

MIDI~trigger~option

. Disk samples can be mono or stereo, wave type nor looped.

Since disk samples are loaded asynchronously, they do not affect the playback of RAM samples, that is there is no perceivable delay for the triggering RAM samples while data is being read for a disk sample. Therefore in memory samples and disk samples should coexist without problems dplayback. Typically, disk samples are given a high priority so that they are not unexpectedly interrupted.

Wave (sample)

A wave sample is consists of a set of two or more waveforms. Only one of the waveforms is played at any one time. By sending MIDI controller messages to Sample-X, it is possible to alter the played waveform. Therefore, with the correct set of waveforms, it is possible to achieve a filter open/close simulation. See the demo. Furthermore, Sample-X provides a tool fo building wave samples.

A wave type sample is always in RAM.

{b}DCA

{b}Drag' n' Drop

1.8 Sample-X MIDI implementation

Generated by sequencers, keyboards etc Sample-X responds to the ← following MIDI information.

Note Off

Sample-X moves to the Note Off section of a sample's volume envelope and (possibly) wave envelope (see the Sample~View~window). This may or may not

result in the sample being cut-off abruptly.

Note Velocity

The higher the velocity the louder the samples are played.

Channel pitch-bend

The pitch-bend value extends from 0 to 127 which corresponds to the extreme up/down (left/right) positions of the pitch-bend wheel on the MIDI keyboard. The amount of pitch-bend applied to a sample is dependent on the pitch-bend value for the MIDI channel (see

Channel~Info~window
).

--- MIDI CONTROLLERS ---

MIDI controller messages generated by master keyboards and sequencers have the format of 3 bytes, Bn xx yy (hexadecimal numbers) where

n = 0-15 (or MIDI channel 1-16
xx = controller number 00-7f
yy = controller value 00-7f

Channel volume (controller number 7)

Sample-X looks for volume information on controller number 7. All playing samples which belong to the specified MIDI channel are affected by this command.

Channel panning (0a hex)

This is standard for all MIDI devices implementing this feature. The pan value causes a sample to locate to the far-left (0), the far-right (127) or somewhere in between, eg the middle (63), in the stereo field.

Waves (10 hex)

Sending controller number 16 with a number (0-127) will determine the offset of wave samples on that MIDI channel. The given value (0 to 127) leads to an offset of (-8 to +7) with

0 corresponding to -8,
64 corresponding to 0 offset and
127 corresponding to +7 offset -

the quick calculation is $(\text{wave} / 16) - 8$. See

Sample~View~window
to see how

this offset affects how wave type samples are played.

NOTE: this has the effect of updating all samples of wave type on a MIDI channel.

Disk wait (13 hex) / Disk trigger (14 hex)

When a NOTE ON message arrives, a sample is triggered immediately. This can be a problem for disk samples since Sample-X has to seek to the correct position on the harddrive AND read some data. Consequently, disk samples may trigger too late. One way to avoid this latency is by triggering your disk samples earlier than expected OR use

the 'disk wait' controller command

The action then becomes

- i) prepare disk sample by reading its data
- ii) trigger disk sample (data is already in memory)

Sending controller 19 with non-zero value turns on the WAIT FOR TRIGGER (WFT) option while 0 turns this feature off. Sending controller 20 will trigger any disk samples waiting to play for the specified MIDI channel.

Procedure

controller B2, 13, 5	- Turn on WFT option (MIDI channel 2)
NOTE ON 92, 3C, 70	- Read Disk Sample data
controller B2, 14, xxx	- Trigger sample
NOTE OFF 82, 3C, 7f	
.	
.	
controller B2, 13, 0	- Turn off WFT option (MIDI channel 2)
NOTE ON 92, 3C, 70	- Read and trigger disk sample immediately

xxx - don't care

1.9 Getting Started

Use the Install_Sample-X program to set-up Sample-X correctly on [your](#) system. This really is the best way since there are different configurations which depend on whether you intend to use Sample-X with Music-X or as a standalone program which is driven by an external MIDI device.

It is not necessary to know this but Sample-X takes some arguments

.

Click on one of the buttons which explain the different uses of Sample-X.

A.

~Sample-X~with~Music-X~

B.

~Sample-X~with~an~external~MIDI~keyboard~or~sequencer~

C.

~Sample-X~with~Bars&Pipes~

1.10 Sample-X Tooltypes

Sample-X takes the following tooltypes

```
NOAUDIO           - Mute Sample-X
MIDILIBIN=MidiIn  - Use midi.library and with portname 'MidiIn'
RAWIN=serial.device - Use raw driver on device 'serial.device'
RAWBAUD=31250     - Set speed of raw driver to 31250
CAMDLIBIN=in.1    - Use the camd.library with portname 'in.0'
RTE               - Use realtime envelopes
```

The CLI arguments are

```
NA=NOAUDIO/S      - Mute Sample-X
ML=MIDILIBIN/K    - Use midi.library and with portname 'MidiIn'
RI=RAWIN/K        - Use raw driver on device 'serial.device'
RB=RAWBAUD/N      - Set speed of raw driver to 31250
CI=CAMDLIBIN/K   - Use the camd.library with portname 'in.0'
RTE=RTENV/S      - Use realtime envelopes
```

Examples

```
Sample-X ri=hyperCOM1.device rb=38400 (Use high speed MIDI on Port Jnr)

Sample-X ml=Arp                          (Use midi.library with input
                                          from program Arp)

Sample-X rte ml=MidiIn                   (Use realtime envelopes and
                                          internal serial port through
                                          midi.library)
```

1.11 Sample-X and Music-X

Starting up

The assumption at this point is that you have run the Install_Sample-X program so that

1. The xphantom driver exists in the DEVS:MIDI drawer. If there is no DEVS:MIDI drawer then Music-X is possibly not installed on your Amiga.
2. One of the tooltypes for Music-X now reads something similar to

```
"MIDIPOINTS=internal,1A|xphantom,2A"
```

or looks~like.

- a) Double-click on the icon entitled Music-X, wherever you keep it.
- b) Double-click on the icon entitled Sample-X. It will start after a few seconds.

Sample-X can be run from the CLI if desired (euh!) but Music-X cannot.

Redirecting keyboard input data

Okay with the Sample-X screen finally open everything is almost ready. If you have a master keyboard then you can allow it to communicate directly with Sample-X by doing the following. Go to the Filters~Page in Music-X and from the menu select Filter Out under File. A requester will pop-up listing the available banks (typically internal and xphantom). Choose xphantom and select OK. From the same menu strip switch off (uncheck) the item Echo Same Bank. You have now requested that data arriving at the MIDI IN port of your interface should not be sent to the MIDI OUT port but instead redirected to the MIDI OUT of xphantom (ie sent to Sample-X).

Want to check if Sample-X is receiving MIDI data? Set the MIDI transmit channel on your master keyboard to #1. On the Sample-X screen, select channel #1 in the channel select window. Open the Channel Configure window and tick the 'Show Note' button. You should now see the notes you play on your master keyboard appear in the ... textfield.

Please remember that samples should no longer be loaded into Music-X since Sample-X is now fulfilling the role.

Okay check out the demos highlighting some of the features of Sample-X and the screen layout section on how to use this program.

NOTE:

It is not necessary to change the tooltypes again when you want to use Music-X without using Sample-X. The xphantom driver knows when Sample-X is loaded into memory and it will pass on MIDI data accordingly. All this happens transparently to Music-X.

If you abruptly stop a sequence, Sample-X may not receive a NOTE OFF message for a corresponding NOTE ON message which occurred before the stop. Hit the Escape key on the Amiga to flush any stuck notes. This problem can typically happen with long disk samples.

If Sample-X is not responding to MIDI data sent from Music-X, then try selecting the Suspend option from the Music-X menu, and then select resume. This has the effect of resetting the xphantom driver.

Since Sample-X is now handling the audio side of the Amiga, you should turn off any sequences (in Music-X) which play on the internal (INT) banks. Otherwise you may get strange noises.

There are some programs like Music-X which can only be started from the Workbench.

Unfortunately, the "Quick start" scripts have to be executed in the CLI environment.

WBStart solves the problem by allowing CLI commands to launch those Workbench only programs.

You can examine the simple "Quick_Music-X" script to see how Sample-X and Music-X are automatically started. It is necessary to have WBStart installed on your system. dospath.library and wbstart.library should appear in the LIBS: drawer and the wbstarter command should be present in the C: directory. The whole procedure is pure laziness on my part because I'm fed up with double-clicking Sample-X and then Music-X. Now I just ONE click an icon in a launchpad utility program :-).

1.12 Sample-X and external MIDI device

It is assumed at this point that the Install_Sample-X program has been successfully run. ←

Double-click on the icon entitled "Quick_rMidi-X" if you do not want to use the midi.library, otherwise double-click on the icon entitled "Quick_Midi-X"

Sample-X should now start. Please wait thirty seconds for Sample-X to initialise.

NOTE:

Using the midi.library allows Sample-X to receive MIDI data from another program instead of, by default, from the internal serial port. Check out the example program

```
DrumPad
.
```

1.13 Bars & Pipes driver

Bars&Pipes (B+P) appears to use Paula audio channel 0 for timing purposes and therefore triggering samples in Sample-X on this channel upsets B+P. In order to get B+P to co-operate with Sample-X, you must use your Amiga with a third-party sound-card such as Delfina, Toccata, Prelude or Melody. It is not possible to have the combination of Bars&Pipes, Sample-X and Paula (internal audio) because of the conflicts. ←

I have provided a optionfo Sample-X which allows you start this program without any audio although it still has the ability to receive MIDI Therefore, I can testify that the B+P driver works correctly.

Procdure

Start Sample-X, change the audio mode to something which does not use the Paula chip.

Start Bars&Pipes.

Start Sample-X.

On the Bars&Pipes screen, open the toolbox window. Select the 'install tool' menu option, and load `sxlk.ptool` which is located in the 'drivers' subdirectory of the Sample-X distribution. Insert the `sxlk.ptool` into tracks 1 - 16 just after the 'MIDI in' tool and insert another copy of `sxlk.ptool` just before the 'MIDI out' tool. B+P will receive MIDI data from your keyboard and then pass it on, through the `sxlk.ptool` to Sample-X. Check this with the

```
Show~Note
square in Sample-X.
```

Using the `sxlk.ptool` causes MIDI data to be echoed to Sample-X whilst still going through the pipeline. Therefore it is possible to have MIDI data to go simultaneously to Sample-X and the serial port (via the MIDI out tool). If this is not desired then use the `sxout.ptool` instead of the `sxlk.ptool`. This is an OUTPUT only tool and thus replaces any other output tool on the track. So for example, it's possible to have 16 normal MIDI tracks and 16 Sample-X MIDI tracks!

Please note that each B+P track corresponds to a particular MIDI channel in Sample-X. For example, Track 2 will send MIDI data on MIDI channel 2 to Sample-x.

1.14 Trouble Shooting

The trouble shooting sections below highlights some of the common ←
obstacles

which may occur when using Sample-X. If however, you have a problem which cannot be resolved, possibly through a bug in the program, please feel free to

```
contact~me
```

```
.
```

```
Sample-X~causes~system~crash
```

```
.
```

Sample-X does not start

Make sure that you have the AHI system installed. Sample-X relies on it to produce any sound.

Which AHI audio mode is Sample-X using? Which MIDI drivers are active?

Select File->About from menu

Music-X cannot...

- find xphantom driver - the xphantom driver is not present in the DEVS:MIDI drawer.
- initialise xphantom driver - FATAL, either the driver is corrupted or Sample-X is not responding correctly.
- see xphantom driver - the tooltypes for the Music-X icon have not been edited.

In all the above cases consult
Sample-X~and~Music-X

.

No sound

Samples need to be configured on MIDI channels before they can be played by an external keyboard or Music-X. However they can be auditioned from the

Sample~Info~window

.

Although the MIDI channel has been configured correctly, MIDI input is actually appearing from a different channel - a typical mistake I make when assigning samples on channel 1 and having my keyboard set to output MIDI data on channel 2.

In Music-X, the external bank to which MIDI data is sent for a sequence does not correspond to the bank (typically Ext2) for Sample-X. To find the correct bank, look at the sync-in bank from the Sync heading in the Music-X menu. The number in the left-hand column represents a driver's bank number. Look for xphantom.

Error

"Specified assignment not done "

- If you try to specify a note range for a sample which is already occupied by another sample or other samples then Sample-X will complain. Select the samples in the Channel~Info window to see which sample or samples are occupying the requested note range.

Delayed or hanging notes

Sometimes if you're passing on a lot of MIDI data very quickly to Sample-X then you may hear the odd note start too late or go on for longer than it should. It basically means that your computer can't keep up with the amount of data being shifted.

- i) reduce the amount of MIDI data transferred

or ii) not use (preferably close down) other programs such text editors or drawing tools, etc while running music sequences. And for Music-X users, turning off the Scroll facility on the Bar Editor Page definitely helps.

Point ii) also holds true when you modify things on the Sample-X screen which lead to a lot of graphical update, but you don't want to close down that screen do you :-)

1.15 When Sample-X fails

Some users may have problems with Sample-X on their Amiga set-up which may cause the program to crash.

(1)

After much investigation (and effort from others in the Amiga community), I have concluded that the system crashing could be owing to a bug in the system maths libraries (mathieesingtrans.library or something similar). If you are experiencing problems, then you are advised to pickup the patch from the Amiga Technologies WEB site (<http://www.amiga.de>) which should correct the problem.

Sample-X has not been specifically coded for FPU equipped Amigas. It should also work on FPU-less Amigas, and I've verified this on my unaccelerated, no hard drive, A1200.

(2)

I have found that using the hi-fi modes of the AHI Paula driver (v4.5) causes Sample-X to crash on my A1200 set-up. However, using the non hi-fi modes with Sample-X is far more stable.

Also, you can try using Sample-X without AHI audio to see if the problem still persists. Start Sample-X from the CLI with

```
Sample-X na
```

or add the tooltype 'NOAUDIO' to the Sample-X icon.

1.16 Demo

```
~DrumPad~  
connected to Sample-X
```

```
Wave Filtering
```

```
Disk samples
```

1.17 DrumPad

DrumPad demonstrates the usefulness of the `midi.library` (thanks Bill). It has a tooltype `MIDIPOINT` which allows you to specify the name of its output data port which is made public and can be seen by other programs.

```
TOOLTYPE    --->  MIDIPOINT=drumPad
or
CLI flag    -o drumPad
```

Start up DrumPad (in the drivers drawer) and you will see a window with four numbered pads on the Workbench screen. Pressing the buttons sends a NOTE ON/NOTE OFF message to its output port - each pad sends a middle C note at maximum velocity to a separate MIDI channel (ie pad 1 to channel 1, pad 2 to channel 2, etc). Okay with DrumPad up and running you need to get Sample-X ready (if Sample-X is already running at this point then quit it). Add the `MIDILBIN` tooltype to Sample-X so that it reads data from DrumPad, ie

```
TOOLTYPE    --->  MIDILIBIN=drumPad
```

Start Sample-X.

Alternatively, just double-click on the icon entitled `Quick_DrumPad`. This is a script which will automatically run the two programs DrumPad and Sample-X.)

If all goes well, the Sample-X screen will appear after a short while. From the File section of the menu strip choose Load Setup to bring in the "Loopism.st" set-up. Now if you click on the pads in the DrumPad window (Workbench screen) you'll hear sample loops go on and off (...it shouldn't take you too long to get all four loops to groove together :-)).

DrumPad demonstrates that any program which is "midi.library" aware can talk to Sample-X. And of course the DrumPad is not tied to Sample-X. It can broadcast its output to any other program.

REMEMBER

Reset the tooltype `MIDILIBIN` to "MidiIn" when you want Sample-X to receive MIDI data from the serial port. Alternatively, if you only occasionally use DrumPad then it may be better to run Sample-X from the CLI with

```
Sample-X ml=drumPad
```

or just use the "Quick_DrumPad" icon.

1.18 The appearance of Sample-X

Menu

File~~~~~

```

Windows~      See 'Windows' section below

Channel~~

Sample~~~

Prefs~~~~

Help~~~~~
  Windows

Channel~Configure~

Channel~Info~~~~~

Select~~~~~

Sample~Info~~~~~

Sample~view~~~~~

Wave~builder~~~~~

Suspend~~~~~

```

1.19 File menustrip

New

Initialise the whole set-up of Sample-X. The effect is to remove all samples from memory and all channel assignments of samples. A requester will pop-up asking for confirmation of an operation which causes complete loss of data. Parameters such as volume and pan on the MIDI channels are then restored to their default values.

Load Setup

Load in a set-up which describes the set-up of sample assignments on all sixteen MIDI channels. Loading in a new set-up clears the present set-up in memory.

Save Setup

Save the current set-up. All samples currently loaded, and their assignments (or layouts) on the sixteen MIDI channels, are recorded in a file for reloading at a later date. Parameters for MIDI channel information (panning, volume) are also saved. If the current set-up involves disk samples, then Sample-X will warn the user to move the disk samples to the same directory where the set-up has been saved. This is so that it can find them easily when the set-up is loaded at a future date. Owing to possibly the huge size of disk samples, it's impractical to save the disk-played samples along with the set-up.

Audiomode

Changes the AHI driver which Sample-X uses to play the samples. It is only possible to select a real-time mode. Therefore FILESAVE audio modes will not work. Please note that the change of audiomode takes place the next time Sample-X is launched.

For the internal Amiga soundchip (Paula), the maximum rate of samples is actually governed by the screen mode used. The standard 15KHz (boot-up) screemode will allow rates up to 28KHz. The VGA mode will allow rates up to 56KHz, ie beyond CD/DAT playback rates.

Screenmode

Changes the resolution and display type of the screen used by Sample-X. Please note that the effect takes place the next time Sample-X is launched.

Palette

Permits the user to change the screen colours. If the changed colours are recorded with save~settings then Sample-X will henceforth start with those chosen colours.

Suspend

Suspends~Sample-X

.

User

Displays details about Sample-X being (un)registered. May also mention the registered user.

About

Gives information about the current version of Sample-X, the used MIDI drivers and available memory.

Quit

A pop-up requester will ask for confirmation of the action and then the Sample-X screen will close.

1.20 Preferences

Filter

Turns the Amiga audio filter on and off.

Audiomode

Changes the AHI driver which Sample-X uses to play the samples. It is only possible to select a real-time mode. Therefore FILESAVE audio modes will not work.

For the internal Amiga soundchip (Paula), the maximum rate of samples is actually governed by the screen mode used. The standard 15KHz (boot-up) screemode will allow rates up to 28KHz. The VGA mode will allow rates up to 56KHz, ie beyond CD/DAT playback rates.

Screenmode

Changes the resolution and display type of the screen used by Sample-X.

Palette

Permits the user to change the screen colours.

Save settings

Save settings about the current set-up in Sample-X and use them next time the program is launched. This includes the hardware filter, choice of screen mode, audio mode and the position of opened windows on the Sample-X screen.

1.21 Channel menustrip

Load Channel

This option loads in a pre-configured MIDI channel with or without samples onto the currently selected MIDI channel in the

Select-window

. If the

sub-menu option "with samples" is chosen, then the channel data and the samples it uses are loaded. If the samples used are already in memory, that is they appear on the list in the

Sample-Window

, then they will not be

loaded again. The sub-menu option "no samples" is then useful in this case. If however the samples specified in a channel set-up are not pre-loaded, then loading the set-up will be unsuccessful or partially successful. An error message will pop-up for each sample specified in a channel set-up which is not already loaded.

Save Channel

This option performs the opposite action to Load Channel. Once a MIDI channel has been configured with samples, it is possible to save it with or without the samples to file. The "no samples" option permits the recording of different assignments (ie different channel setups) of a sample which could appear on ALL sixteen MIDI channels without unnecessarily saving the same sample sixteen times.

Flush Channel

All the assignment of samples on the MIDI channel(s) can be removed by

selecting "current" for the current MIDI channel or "all" for all sixteen MIDI channels. Note this option is different to

New

because it cleans the MIDI channels but preserves any samples already in memory.

Replace

This menu options allows you to substitute one sample for another. This is useful if you already have a sample configured on a MIDI channel and you want to test whether another sample would sound better in its place. First you must have the Sample Info window open and you must select a sample to replace. Upon selecting the 'replace' menu option, another sample list window will appear. Choose the replacement sample. Select 'replace' to confirm action or 'cancel' to abort.

1.22 Sample menustrip

Load Sample

Used to load samples which should be of Exiff format. Sample-X is capable of loading mono or stereo IFF samples and WAV/AIFF samples (8/16bits) which are then automatically converted to the Exiff format. Please note that the WAV/AIFF loader is very basic. It cannot handle compressed samples which include mpeg encoded wav's. Looped samples must loop to the end for them to be recognised correctly. If Sample-X does not understand the format of the sample, it will provide an option to load it as a RAW sample which can then be subsequently configured.

Sample-X will attempt to change the suffix (.svx or .iff) of the sample name to .xff to reflect the change.

Information about the loaded sample (which becomes the currently selected one) is displayed in the

Sample-Window

. Currently the maximum number of samples in memory at any one time is 64.

Save Sample

Used to save samples after some of its parameters have been modified. All samples are saved in Exiff format. Saving disk samples only saves parameters such as priority, the envelope, etc. It does not save the sample data. Furthermore, changing the filename for disk samples in the file requester has no effect (the saved filename must be the same as the loaded filename). The user may notice a brief silence in audio play when saving a modified disk sample. The reason is that is not possible to play (read) a sample file which is simultaneously being written.

Flush Sample

With this option the "current" sample or "all" the samples currently loaded can be flushed. The "unused" option removes those samples which have not been assigned to any MIDI channels. The flush operation differs from the

New

menu option since it preserves the settings such as volume and ←
panning for
the sixteen MIDI channels.

Disk Toggle

It is possible to change a sample's playback source using this menu option. Thus a sample which plays from RAM will subsequently play from disk and vice versa. NOTE: this menu option does not work with wave nor looped samples.

When converting a disk sample to RAM sample, Sample-X will attempt to load the whole sample and the report success or failure. When converting a RAM sample to a disk sample, Sample-X will prompt you for a filename. On success, the converted sampled will appear in the Sample info window. Note that for session/set-up saving, disk samples must appear in the same directory as the session file.

Load Raw

If a sample is not recognised by the normal load sample routine (which handles WAV/IFF/AIFF/XFF) then try this option.

Configure

The submenu options listed below are used for configuring only RAW samples. They are not conversion routines for normal samples, that is those which are not marked (raw) in the

Sample~Info~window

. The objective is to configure a
RAW sample of unknown format so that it is heard correctly in SampleX.

8 <-> 16 bits

It is possible that the RAW sample is composed of 8bit or 16bit sample data. This option toggles between the two possibilities to give an idea of how Sample-X should treat the sample.

Mono <-> stereo

The sample data may consist of mono data or interleaved stereo data.

Unsigned <-> Signed

Sample-X (or more precisely AHI) requires samples to be in signed format which means that 8bit sample values span from -128 to 127 and 16bit sample values span from -32768 to 32767. Unsigned samples (8bit, 0 - 255 and 16bit, 0 - 65535) will not play correctly unless they are converted.

Byte swap

Primarily here for changing between Amiga-based Mortorola 16bit format (MSB/LSB) and Intel 16bit format (LSB/MSB). This option will probably be needed if Sample-X loads RAW a sample which can from an Intel-based (nearly all :) computers.

1.23 On-line help facility

Main

Bring up the on-line documentation which you are now reading.

1.24 Channel configure window

After the Sample Info window the Channel configure window is probably the second most consulted view. ←

Test button

Causes Sample-X to switch from Configure Mode to Test Mode. Leave unselected for Configure mode.

Configure Mode

The Keyboard

This consists of two parts:

- Pan - 11 squares which indicate 11 octaves
- Master - 4 octaves of black and white keys

The 'pan' covers the full 128 notes (0-127 or c0-g10) defined in the MIDI implementation. Selecting a square changes the current octave and therefore the note range which appears in the 'master'

Clicking on one note followed by a click on another note will cause an update to the MidiKeys and Range boxes. Furthermore a brown strip covering your selected range will appear above the master and on the pan. Clicking just below a note (that is just below the master strip) causes a box to appear. This corresponds to the pivot note and appears in the Pivot box.

Show Note button

This is used to turn on/off a tracking square which moves along the keyboard in the Chancon window according to the MIDI data received by Sample-X. Midi data must be arriving on the currently selected channel in the Select window for the effect to work. A tracking square will move along the keyboard according to the MIDI data present. The value of the tracked note is also displayed in the Show Note box. The option here is provided primarily for keyboard users to aid the laying down of samples. It should not be kept on since it slows down the response of Sample-X.

Assign button

This 'assign' button lays down the currently selected sample across the specified note range (the brown strip appearing above the keyboards(s)) for the currently selected MIDI channel. It is important that this button is

clicked otherwise changes made to the note range will not take effect.

The assignment has the following effect. If a MIDI note equivalent to the pivot note arrives, then a sample will playback at the rate specified in the

Sample~Info~window

. The arrival of a MIDI note low causes the sample to be played back at a slower rate (ie lower pitch) and vice versa. It is possible to assign other samples to the same MIDI channel by selecting them, specifying their note ranges and assigning them. At any time you can verify the note range specification for a particular sample on a channel by choosing that sample in the

Channel~Info

is not possible to have note ranges for different samples which partially overlay each other (ie each range is mutually exclusive). Furthermore, it is not possible to have two separate note ranges for one sample on the same MIDI channel.

Remove button

This 'removes' the note range specification for a sample on a channel. If a note range for a sample has been specified incorrectly, then define the correct note range again and click on the A button since it is not necessary to use the Remove button.

Check out the

trouble~shooting

section if you still have trouble getting a sound out of Sample-X.

Test Mode

The master section of keyboard can now be used to trigger samples.

1.25 Channel window

The Channel Info window gives details about the currently selected ← MIDI

channel from the

Select window.

Volume

This field, which can also be updated from MIDI, affects the playback volume of all samples on that channel. A value of 127 gives maximum volume playback whilst 0 effectively silences the sample(s). This function gives real-time volume control during any stage of the playing sample.

Pan

The effect of the panning value entered here depends on the AHI audio mode selected. In a mode with panning, you'll noticed that stereo and mono samples can be moved from left to right within the stereo field. However in

non-panning AHI audio modes, all samples appear in the centre. The pan feature can also be employed for sample-morphs or cross-fadings. See demos.

The MIDI channel pan value can be updated through MIDI through controller number 10.

P bend

The real-time pitch bend feature allows the pitch of samples to be altered continuously. This P bend value states the maximum pitch alteration when the pitch-bend wheel on a master keyboard is moved to its extreme position. A valid p-bend value is from 0 semitones (no pitch change) to 12 semitones (one octave).

P Offset

This display shows the current pitch-bend setting for a MIDI channel and it reads from -8192 to +8064. The greater the value (negative or positive) the greater the deviation of a sample's playback rate from its nominal value. In most cases this value will be 0 which is especially true of MIDI keyboards which have spring loaded pitch-bend wheels that always return to their centre (0 pitch-bend) position. However, it is possible to send arbitrary pitch-bend values from say Music-X to Sample-X, so if samples sound out of tune, this p offset reading is handy.

W Offset

This displays shows the current wave offset which can range from -8 to +7. If wave type samples are not playing correctly then consult this value. See

Sample-View-window
for how wave type samples are handled.

NOff switch

This button determines whether a particular MIDI channel will respond to NOTE OFF message. If it not checked then Sample-X will ignore NOTE OFF MIDI messages. This is invaluable for playing loop samples or long disk samples where it would be necessary to hold a key down on a keyboard for a long time. Assuming that you have

a~configured~sample
, you simply press a key to
start it, then press the same key to stop it.

M switch

This button turns on and off the mute facility of a channel. When it is ticked any samples from that channel which are currently playing are stopped and the Sample-X no longer responds to any new MIDI notes for that channel. The channel can be made active again by clicking on the switch again to clear the tick.

P switch

This button specifies whether the channel is monophonic (unticked) or polyphonic (ticked). With a monophonic setting it is not possible for two samples assigned to the same MIDI channel to play at the same time. The

polyphonic mode allows the samples to play simultaneously.

Rev switch

Causes samples on the selected MIDI channel to play backwards.

FX switch

Causes samples on the selected MIDI channel to play with delay fx.

Update button

This button updates the Channel Info window. Parameters such as the volume, panning and pitch-bend can be altered through MIDI and so the window values are not always strictly in sync with the true MIDI channel parameters. Of course, the updates could have been done automatically according to the MIDI data arriving, but the objective is to limit the number of graphic updates as with the

Play~Key
option.

Samples used

This list view indicates the samples (alphabetically ordered) which have currently been assigned to MIDI note ranges on the currently selected channel. Clicking on a sample causes important updates in the

Sample~Info
and
Channel~configure

then there will be no sound heard for MIDI notes arriving on that particular channel. Therefore it is important to

configure~a~MIDI~channel
before trying

to use it.

1.26 Sample window

The Sample Info window holds detailed information about samples ←
currently
loaded into Sample-X. The large display to the left alphabetically lists all the samples which are currently loaded. Clicking on any sample makes it become the currently selected item. In the middle of the Sample Info window is a description of the selected sample. Its name appears in an editable box followed down below by its

TYPE - (mono or stereo) where (L) indicates that it's looped.
The type box may also display a (W) which indicates that the sample is of wave type.

RES - 8bit or 16bit resolution

SOURCE - RAM (Chip/Fast) or Disk for disk sample

LENGTH - xxxxx bytes. This figure is for one channel only, so the length

of a stereo sample is twice the displayed value.

SAMPLES

TIME

To the right of the window are some editable fields. These are

Sample priority

Entering a value between 0 and 99 determines the importance of a sample when playing on one of the 32 Amiga audio channels. The higher the number the less likely the sample will be stopped during playback if new MIDI notes (and therefore samples) arrive for playing. The feature is very handy for playing uninterrupted disk samples.

Rate

This field refers to the playback frequency of the sample at the pivot note. The higher the frequency the higher the pitch of the sample and vice versa. samples per second which is calculated on from the PAL/NTSC clock. This box is automatically updated when the period field is altered. The maximum frequency is 56KHz although whether the sample can play at this rate depends on the AHI audio mode in use.

Waves

This non-editable field specifies the number of waveforms which compose a wave type sample.

Audition button (speaker icon)

This is the audition button and it allows you to hear the sample before configuring it on a MIDI channel. It is important that the mute facility (in the

Channel~info~window

) of channel 1 is not checked in order to hear the sample. Furthermore, if you wish to play the sample in reverse or with the delay effect, then the corresponding flags for MIDI channel 1 must be checked.

The sample plays back at its default rate.

Stop button (crossed speaker icon)

Stops the auditioned samples. In fact, it actually signals the sample to play its NOTE OFF section which may or may not result in the sample going straight to silence. For a better understanding, see the envelope section in the

Sample

View~window

.

Loop button

This turns off or turns on the loop facility of samples (useful for drum loop samples). This looping facility is limited since it is not possible to set the start and end positions of loop. NOTE: this option does not work with disk type samples.

1.27 Sample View window

The Sample View window displays a plot of the sample which is ←
currently
selected in the
Sample~Info
window. Disk samples are not plotted but
indicated by a disk icon in the top plotting area. NOTE: there are no sample
editing features available.

The bottom part of the window displays a volume envelope or, if applicable, a wave envelope for a sample. The volume envelope consists of five adjustable boxes which are linked. Moving each one vertically gives a reading between 0 and 127 in the Vol box. When a sample is triggered its volume will change according to the envelope graph. How quickly Sample-X will move through the envelope (from left to right) depends on the value specified in the Rate box - low values give a quicker update. The special brown envelope box is known as the sustain box and it indicates the point where Sample-X should stop moving along the envelope after receiving a MIDI NOTE ON message to trigger the sample. The envelope section to the right of the sustain box represents how the sample volume changes when Sample-X receives the MIDI NOTE OFF message. Use the sustain buttons (icons with miniature envelope graphs and left/right arrows) to change the sustain box.

If any of the envelope boxes are moved then the Wave box displays the selected waveform out of all those composing the wave type sample.

The wave envelope works in a similar manner o the volume envelope. When a wave sample is triggered, it will go through its waveforms according to the wave envelope graph. The actual waveform played depends on the value in the envelope graph AND the wave offset value specified in the MIDI channel. For example a wave sample may consist of ten waveforms, and its (ramping) envelope has been configured to play waveforms 5 to 8. If the sample is playing from a MIDIchannel whose wave offset is -2 then Sample-X will actually play waveforms 3 to 6.

The wave change buttons (icons containing mini sample plots with up/down arrows) can be used to go through the different waveforms if the currently selected sample is of wave type. If the doWave gadget is not checked then the currently selected waveform, whose number appears in the W# box, is heard on pressing the audition button in the

Sample~Info~window

. Otherwise,

if the doWave gadget is checked then Sample-X will play the wave envelope which may or may not result in the play of the different waveforms.

1.28 Suspend window

The Suspend window pops up following the selection of the Suspend ↔ option from the

File menu strip. All audio is stopped, the MIDI drivers are free their resources and Sample-X becomes inactive. This allows Sample-X to be run alongside (but not simultaneously with) other programs which need access to various resources such as the serial port or the Paula audio chip.

1.29 Select window

The Select window provides a slider which controls the overall (or ↔ master) volume of all samples played by Sample-X. At the top of the slider (200%) is maximum volume, which can be used to boost very quiet samples. However, if there are many samples playing then distortion (from digital overload) may occur. A safe bet is therefore to keep the master volume below 100%. The bottom of the slider (0%) is minimum volume which in effect gives silence even though samples may be playing.

The column of 16 buttons allows the user to choose which of the 16 MIDI channels to view. Clicking on one of the channels will update information in other windows to reflect that channel. See the Channel~configure window for example.

Cutall button (crossed speaker icon)

This causes all samples which are currently playing on any of the MIDI channels to cease playing. It does not stop any samples which are subsequently triggered. The button is primarily used to stop the audio if there are any hung MIDI notes. If the user wishes to stop all audio on a MIDI channel then check the mute button in the Channel~Info window.

DCA

Delay FX

Please note than when using the delay fx panel, 8 out of the 32 audio channels used by Sample-X are reserved for the fx. That is you have up to 8 polyphony for effected (WET) samples and up to 24 polyphony for dry samples. It is not possible to set the amount of effect for each MIDIchannel... there is only one global setting which is changed in the Channel select window.

Please also note that using the delay effect takes up a lot of processing time and you will therefore occasionally notice a slowdown in Sample-X's performance (well I do on my 68030), especially if you're running Music-X as well. Turn this effect of when not in use.

Time

This provides the time in milliseconds between successive delays. Set to a short value (10) for a vocoder/flamming effect and a longer value (500) for a more echoey effect.

Wet

This provides the balance between the Wet and Dry signal of an effected sample. A setting of 0% means play just the dry signal, which is how the sample sounds without any effect. A setting of 100% means play only the Wet signal, which is how the sample sounds after it has been through the delay processor. A desirable setting is anywhere between these two extremes.

Feedback

This slider determines the percentage of processed signal which is fed back into the processor. A value of 0% means that no signal is fed back and therefore the resulting sound will typically be the dry sample signal followed by ONE wet sample signal at the set delay time. A higher feedback value will result in more and more wet sample signals being heard at the intervals determined by the delay time.

1.30 Wave Builder

The wave builder window provides the user with the opportunity to build wave type samples. It has two sample lists entitled 'samples' (A) and 'wave samples' (B). List A displays all the samples which are currently loaded into Sample-X. List B displays samples used to build a wave type sample.

To add a sample to list B, select it from list A and then click the '>>' button. Note that all samples appearing on list B must be similar in terms of whether they are mono/stereo or 8/16bits. That is, it is not possible to combine mono/stereo samples nor 8/16bits sample (otherwise an error warning appears). The first sample added to list B determines which other samples will be permitted. Please note that a maximum of 16 samples can be added to list B.

Above list B is the Name field. You must provide a name for the new sample, which will be automatically given an '.xif' extension.

The buttons appearing under list B are

- up - move the selected sample up one position on the list
- down - move the selected sample down one position on the list
- delete - remove the sample from the list

morph

Determines how the wave type sample is constructed. If it is not ticked, then wave sample will consist of samples appearing on the list B. If ticked, then the wave sample will morph between the first and second samples. The number of waveforms used to achieve the morphing depends on the value of Waves. Therefore, it does not matter how many samples appear on list B since only the first two are used.

Build

Construct the wave type sample.

Please note that sample morphing is very basic. The sample rate of the new sample is set according to the first sample on list b. Furthermore, for morphing operations, all generated waveforms will have a length similar to the first sample. Therefore do not set your aims too high. There is no time stretching or pitch-shifting facility.

1.31 Hints

How do I create a disk sample?

~- Load a sample (RAW/AIFF/IFF/WAV type) into Sample-X
- Choose 'disk toggle' from Sample menu.
- Provide a filename for the sample.

Note: One limitation is that the maximum size of a disk sample depends on the amount of ram you have on your Amiga.

Sample trigger seems slow. How do I get a faster response?

- Reduce the multitasking on your Amiga
- Omit the realtime option for Sample-X
- Turn off the "Show Note" option on the Channel configure window
- Turn off the "Update" option on the Channel Info window
-

The on-screen keyboard does not work

- Make sure a sample has been assigned
- Turn on the 'test' button

Why are the volume or wave envelopes not working?

- Sample-X must be started with the realtime option

Sample morphing is very basic, no sample rate conversion, it only considers the first two samples on wavelist

1.32 Bug Report

Sample-X has only been tested on an A1200 and an accelerated A1200 (68030 CPU and 16MB FAST RAM), and so I invite others to try the program on other Amiga's and report to me their experiences (good or bad). While all of the features of Sample-X have been tested extensively, it is impossible for me

to catch every bug. Therefore, please help me by reporting the bugs stating the exact procedure of how you caused them to appear. This will help me immensely in determining how the bug occurred. My objective is to make Sample-X as stable as possible irrespective of its features. I myself use the program in my music set-up so reliability is important.

I can be contacted through

email: sheun@soi.city.ac.uk
tel: +44 181-534-4232 (ENGLAND)

Known bugs

Do not use the wave samples. They are unstable and can cause Sample-X to crash. I'm trying to find the cause of the problem.

1.33 Acknowledgements

A sincere thank you goes from me to the following people whose tools have helped to spur productivity in the Amiga development community.

Martin Blom

For the exceptional AHI system, something which should have appeared ages ago to make audio coding on the Amiga simpler.

Edd Dumbill

The author of the AmigaGuide editor which has made it easier for me to enter this documentation.

Michael Sinz

For the excellent (do not code at home without it!) Enforcer tool

Matt Dillon

For the DICE compiler.

Jan van den Baard

Whose GadToolsBox program was at the heart of the Sample-X GUI creation.

Bill Barton

For the midi.library. Saved me the headache of interpreting MIDI messages on the serial line.

David Joiner

For Music-X which even back then had the open architecture for expansion and thus still sees wide use today.

Peter Mills

Who has been instrumental in suggesting new features and pointing out problems when using Sample-X.

Steve Davis

A close friend who helped to test the program and given loads of encouragement and positive feedback.

(and last but not least)

Mikko Karvonen

Who has bugged me (for want of a better phrase) continuously to improve Sample-X which has resulted in what you have before you.

1.34 Registration

Sample-X is a powerful addition to your Amiga sound set-up regardless of whether you use it with Music-X or not. By experimenting with the demo version, you'll be able to determine whether the full version is suitable for you.

To obtain the full version, send me a cheque, banker's draft or international money order. Please ensure that the payment, AFTER transfer fee deductions, stands at 30 pounds (British sterling) or \$50 US. On receiving payment, I will then send you a personalised key either as a file through email or on a floppy disk via ordinary post. Please state preference and mention full name and (email) address.

Name: Sheun Olatunbosun
Address: 11 Leywick Street,
Stratford,
London E15 3DD,
ENGLAND

Email: sheun@soi.city.ac.uk

Account details

Bank: Lloyds Bank,
Branch: Stratford, London, ENGLAND
Account no.: 00874823
Sorting code: 30 92 90

NOTE: The personalised key allows a user to access the full functionality of present and future versions of Sample-X.

1.35 Distribution

This software is shareware and it may be freely distributed so long as the archive continues to hold the files in listing.doc. Charging for the software should not be significantly more than the cost incurred from distributing the media. The author grants the right for Sample-X to appear on a magazine cover (floppy) disk or any compact disc collection with the

premise being that he is notified of such action.

This ruling applies to the unregistered version of the software. In the case of the registered version, under no circumstances should the user distribute his personalised key.

1.36 Copyright

Sample-X and xphantom) are the copyright of Sheun Olatunbosun.

Other parties hold copyrights to the following software.

AHI system	- Martin Blom
midi.library	- Pregnant Badger music.
GadToolsBox	- Jan van den Baard
DICE	- Obvious Implementations