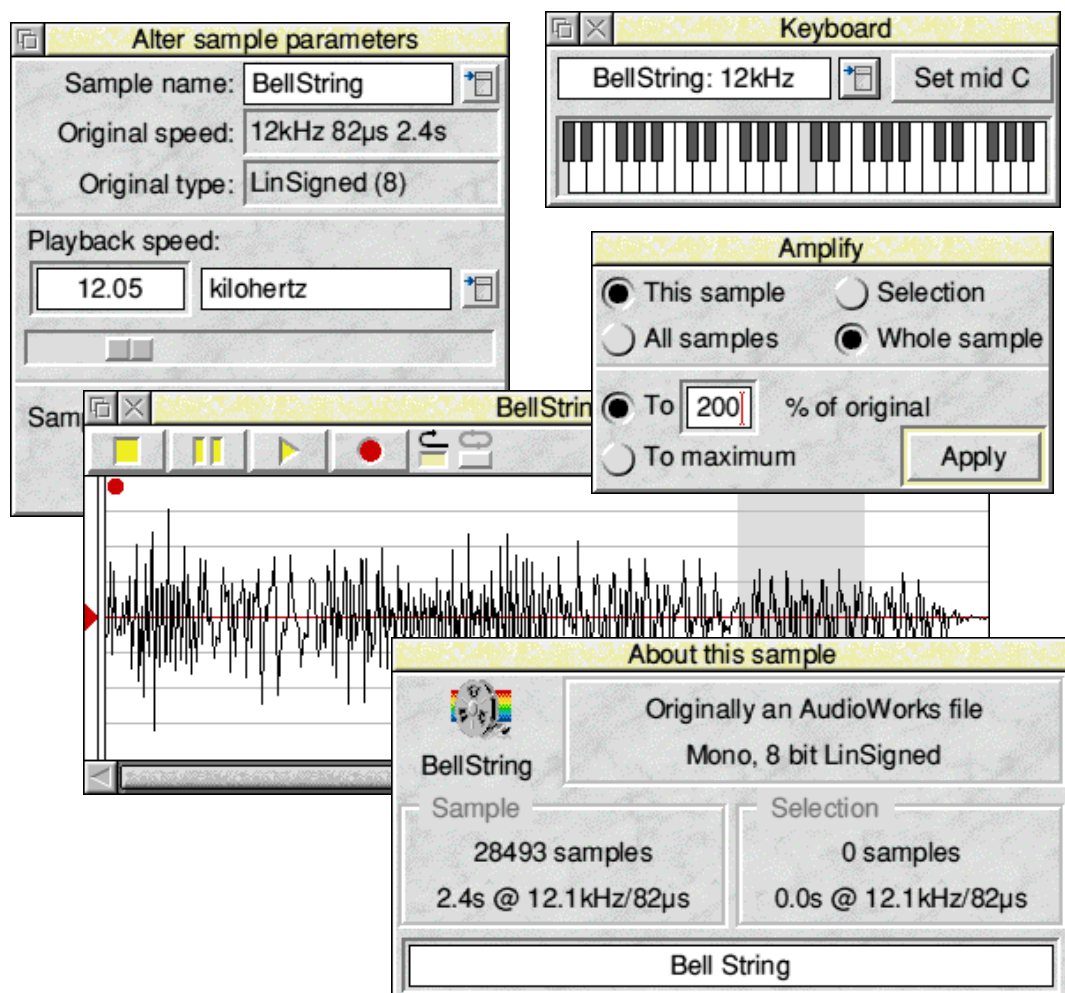




AudioWorks

THE SOUND EDITING SUITE FOR RISC OS COMPUTERS

ProAction

3QD
DEVELOPMENTS LTD

APDL

AudioWorks

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Introduction

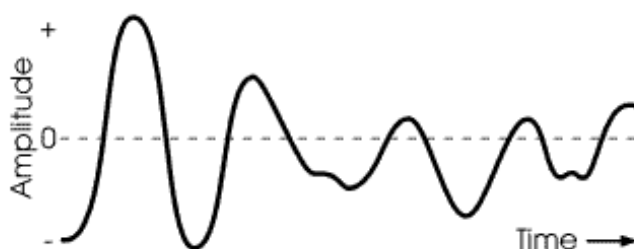
AudioWorks is a general purpose sound editing program. It can take sound samples in a variety of formats and then manipulate these samples. The samples can then be played or stored back to disc, again in a variety of formats.

Before describing how to use AudioWorks, it is helpful to explain some of the basic terminology and the various sample formats.

Digital Sound Samples

Historically, sounds have been recorded on analogue devices such as tape recorders. The continuously changing vibrations that make up a sound are converted into an electric current and then stored as a continuously changing magnetic signal on the tape itself.

If we were to look at a recorded analogue signal using an oscilloscope, we might see something like this:



This wave represents the vibrations which we hear as sound.

The waveform is regarded as having an amplitude of 0 when it touches the dotted centre line. Above the line are positive amplitudes, and below it are negative.

Volume

The more violent the swings between positive and negative amplitudes, the louder we perceive the sound to be. (The above sound is loudest at the beginning.) An amplitude of 0 is silence.

Thus, amplitude can, for our purposes, be considered roughly equivalent to volume.

(It is sometimes also called '*speaker deflection*', as the speaker cone must move in and out in a similar pattern to the waveform to generate equivalent sound vibrations.)

Frequency

The time interval between the swings determines the frequency of the sound. This interval is called the '*period*' of the sound. The number of such swings each second, from positive to negative and back to positive, is the '*frequency*' or '*pitch*'. This period is longer for low-pitched sounds than high-pitched.

Digital Sound and Sampling

So how do we store such a sound in a computer? Computers are based upon digital circuits. This means they can process numbers, but not continuously changing analogue signals.

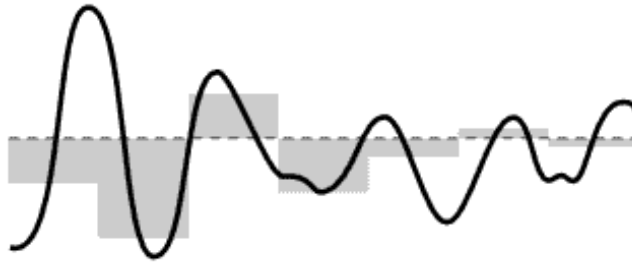
The solution is to '*sample*' the analogue signal. That is, taking '*snapshots*' (samples) of the amplitude at frequent and regular intervals. Each snapshot can then be stored as a number representing the amplitude at that point, and a sequence of snapshots can be used to control a speaker to approximate the original waveform. (This is similar to cinema film, where a sequence of still pictures are flashed on the screen in rapid succession and this gives the appearance of movement.)

Continuing with the cinema analogy; if you slow the film down, it becomes flickery, and then jerky. Slowed down even more, objects seem to jump across the screen rather than move in a fluid, natural manner. This is because we are only using snapshots of the scene, and all movement between the snapshots is missed.

So what happens to the computer's representation of a sound if we sample too infrequently?

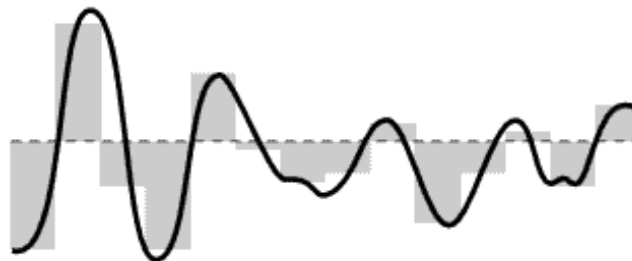
In the picture below, we record samples at regular intervals. Each grey bar shows the level captured by a

sample in the middle of each interval.

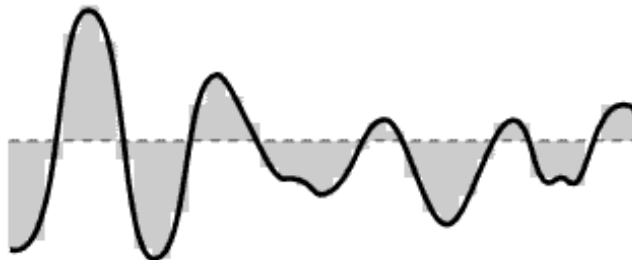


Note how the first high wave is completely missed by our samples. In fact, most of the waves in the sample are missed.

If we double our '*sampling frequency*', we get the following set of samples. Already, we catch a much better picture of the original waveform.



If we use five times our original sampling frequency, our digital samples come very close to the original waveform:



To successfully sample an analogue signal of frequency f , we usually need to take at least $2f$ samples every second.

The human ear can detect frequencies between about 20 and 20,000 hertz (waves per second). Digital compact discs (CDs) are recorded at roughly twice this rate at 44,100 samples per second, and digital audio tapes (DAT and so on) are typically 48,000 samples per second. Telephone-line quality is much lower and rated digitally as only 8,000 samples per second.

Of course, storing all these samples takes memory. Because of this, common sampling rates on computers are a compromise between quality and memory and normally range between 8,000 and 22,000 samples per second. The internal Acorn sound system defaults to 20,833 samples per second, but is capable of higher rates.

Sample formats

As well as a wide range of sampling rates, there are also a wide range of sample formats. AudioWorks supports several formats:

Bits per sample

Remember that each sample is a digitally stored number representing amplitude. The more accurately we can record this number, the more accurately we can represent an analogue amplitude level.

The most common method of storing samples on computers is to use a single byte (8 bits) per sample. This allows 256 different levels to be recorded and is a convenient size for computers to handle.

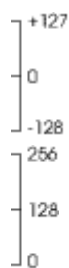
However, the never-ending quest for higher quality reproduction and the decreasing cost of computer memory have led to systems that use more bits per sample. The most common formats are 12 and 16 bits per sample, which can represent 4,096 and 65,536 different levels respectively.

Again, using more bits per sample has a corresponding cost in memory usage.

Sample data format

To confuse matters further, although an 8-bit sample can represent 256 levels, different manufacturers interpret these values in different ways.

AudioWorks supports the standard Acorn interpretation and three other common interpretations. These are:

- 
- Linear Signed** Each sample value represents exactly what you might expect - the range of possible amplitudes is divided into 256 equal areas. Positive amplitudes are represented as positive numbers, negative amplitudes as negative numbers. Linear signed samples can be represented in any number of bits per sample.
 - Linear Unsigned** This is almost identical to Linear Signed format, but the sign is treated differently. Linear unsigned samples can be represented in any number of bits per sample.
 - Logarithmic** This is the Acorn native format. It records the amplitude on a logarithmic scale, which is closer to the natural response curve of the ear. This representation is only available in an 8-bit format.
 - µLaw Logarithmic** This is a common format on NeXT and Sun workstations, and is very similar to Acorn Logarithmic format. (Technically, the sign bit is at the opposite end of the byte and all the bits are inverted.) This representation is only available in an 8-bit format.
- AudioWorks works in any of these sample formats, with 8, 12, or 16 bits per sample. Because it works directly in these formats where possible, conversion between formats is rarely needed. (Conversions between the logarithmic and linear formats always introduce distortions and are 'lossy'; that is, some information is lost.)

When copying and pasting between samples of different formats, AudioWorks automatically converts the source data to the correct format, if necessary. Thus, you rarely need to know which sample format you are working in.

Mono and Stereo

In addition to the various sample formats, sampled sounds can represent mono and stereo sound. To provide a stereo effect, two recordings are made of a sound, for the left and right channels. One channel is played to the left ear while the other is played to the right.

AudioWorks treats stereo samples almost as if they were two separate mono samples, with a special feature to link the two channels together so that they may be manipulated as a single stereo entity.

Terms used in AudioWorks

Sample Frequency/play speed/sampling rate

Sample frequency is usually referred to as *play speed* (when playing) or *sampling rate* (when sampling). A sample only sounds the same as the source when played back at the rate at which it was sampled. Thus play speed normally equals the sampling rate.

Frequency is normally measured in samples per second. However, for convenience, three forms are used in AudioWorks:

- **Hertz(Hz)** This usually means '*waveforms per second*'. However, in digital sampling it has a special meaning of '*samples per second*'. A typical sampling rate would be 20,833 Hz.
- **Kilohertz (kHz)** This is a related term, meaning '*thousands of samples per second*' for our purposes. 20,833 Hz is approximately 21kHz.
- **Microseconds delay between samples** (' μ s delay', or just ' μ s') This is an alternative way of expressing sampling rate. This is the time interval between samples. This interval is usually measured in microseconds (millionths of a second).

$$\mu\text{s delay} = 1,000,000/\text{Hz}.$$

20,833 Hz is a delay between samples of 47.61 μ s (usually rounded to 48 μ s).

Samples

The word '*sample*' is a little ambiguous, as it is commonly used to refer to both single samples and sampled sounds comprising many individual samples.

Usually the difference is clear from the context but where ambiguity may arise, we refer to a sampled sound as a '*sound file*' or '*sound sample*' and individual amplitude snapshots as '*samples*'.

The Current Sound Sample

AudioWorks allows you to load, play, and edit several sound samples at once. However, some functions can only operate on a single sound at any time. These include the keyboard and Alter windows, as well as the envelope effect. (All these are detailed later.)

AudioWorks therefore has the concept of the 'current' sound sample.

By clicking in any sample window, you can make that sample the current sample. It is given input focus (the title bar changes to yellow and any key short-cuts apply to that sample). A red dot in the top left corner of the sample display indicates which is the current sample.

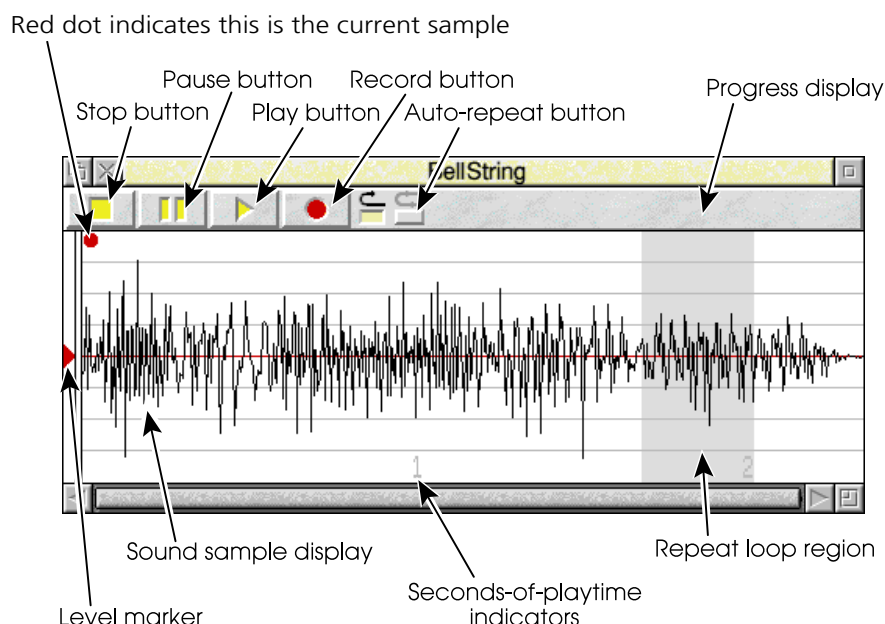
To make a sample the current sample:

- click in the sample window
or
- some options (such as *Alter*) can display a menu of samples currently in memory. Choosing a sample from this menu makes it the current sample.

Tutorial

Let's get started. Double-click on *!AudioWrks* to run the application. The AudioWorks icon appears on the right hand side of the icon bar.

Double-click the example sound sample *BellString* or drag it onto the AudioWorks icon on the icon bar) to load the sound. This opens a window:



The Tool Icons

The **Stop**, **Pause**, **Play** and **Record** buttons act just like buttons on tape-recorders. That is,

- click on **Play** to start playing the sample;
- click on **Pause** to pause playing, click again to resume playing;
- click on **Stop** to stop playing.
- The **Record** button is used to record your own sounds; its use is described later in *Creating and Recording samples*.

As the sound sample plays, a vertical *play cursor* runs across the display showing which part of the sound you are currently hearing.

This particular sound is a musical instrument, and part or all of it can be played continuously using a *repeat loop* (the editing of which is described later). The pre-set repeat loop is shown in the above picture as a light grey background on the right-hand side of the sound sample.

- Click on the **auto-repeat** button. This changes the playback mode to continuously repeat the looped section.
- Click **Play** again to see (or rather, hear) the effect. You have to click **Stop** to stop playback this time (otherwise it repeats for ever).
- Clicking again on **auto-repeat** resets the playback mode to playing the sample once only.

Positioning the cursor

Clicking in the sample window displays a vertical bar at the point where you click. This is the *cursor* and is used for operations such as pasting in samples. (Pasting is described later.)

Selecting part of a Sound Sample

Drag **Select** inside the sample display to select a region of the sound. As you drag in the white area of the

window, the selection is shown inverted, as is usual in RISC OS. As with most applications, you can also adjust the current selection by dragging or clicking with **Adjust**.

You will notice that, as you drag, the **progress display** in the top right of the window displays how many samples you have selected and the total number of samples in the sound. This tells you the size of the selection.

Shift Left Arrow selects from the cursor or start of the selected region to the start of the sample. *Shift Right Arrow* selects to the end.

Pressing the **Play** button now plays just the selected region. By default, effects and editing options also apply just to the selection.

Click in the sound display to clear the current selection.

If you *Shift-click* in the sound display, AudioWorks selects the entire sound sample.

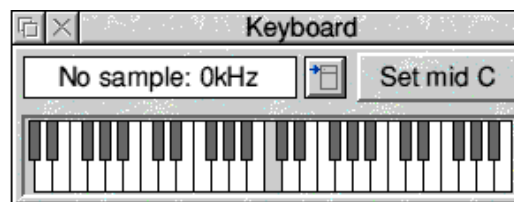
The Level Marker

Across the middle of the window is a red line, with a red triangle at the left end. This is the level marker, used by some editing options as a convenient way of setting levels.

By dragging close to the left of the window you can move this marker up and down (even if the red triangle has been scrolled out of sight).

The Keyboard window

Move the mouse pointer over the AudioWorks icon bar icon and click **Menu**. This displays the icon bar menu. Choose *Keyboard...* This opens a window:

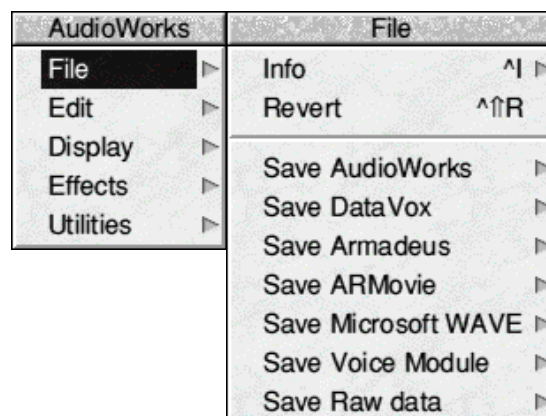


Now, you can play BellString at different pitches by clicking on the piano keyboard display. You can also type on the computer keyboard as in this diagram:



The Sample Menu

Click **Menu** anywhere inside the sample display window to display the sample menu. Move across the arrow of the first item **File**:



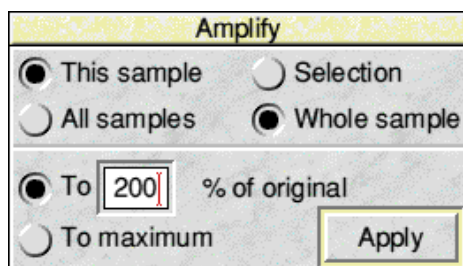
The *Sample menu* section details this menu. For now, continue across the arrow of **Info** . This displays information on the sound:

Now that we know a little more about our sample, let's apply an effect to it.

Press *Esc* to remove the information window.

Click once in the sample display (or press *Ctrl-Z*) to cancel any selected region.

Now, bring up the Sample Menu again, but this time, choose *Effects* then *Amplify*. This brings up a dialogue box:

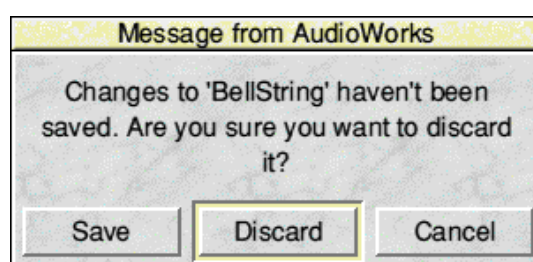


At this stage, ignore the buttons in the top half of the window. Below them, we have a choice of either amplifying 'to 200% of original' or 'to maximum'. Let's leave the settings as they are, which will amplify the sound to twice (200% of) its current volume level. Click the 'Apply' button (or press *Return*) to apply this amplification to the sound.

The **progress display** in the top right of the sample window briefly shows a message 'Amplifying by 200%' with a percentage-complete indication. AudioWorks applies all effects in the background, so that applying effects on large samples does not take over your machine for seconds at a time. The message reminds you what is being done, and shows how much of the task has been completed. In the meantime, you can continue to use the computer and AudioWorks for other things, without having to wait for processing to complete. Often, however, it'll finish before you have time to do anything.

You can now play the sample again to hear the effect of the amplification.

Close the sample display window, by clicking the Close icon (in the top left corner). As you have modified the sample, AudioWorks checks if you really want to discard it:



When this appears, you can do any of the following:

- **Discard the sound** Clicking the *Discard* button, or pressing *Return* , discards the modified sample. Any modifications made since loading the sample are lost.
- **Save the sound** Clicking on the *Save* button saves the sample before you discard it, using the familiar Save-as dialogue box. (See *The Sample Menu* for more information on saving.)
- **Cancel, and return to editing** Clicking the *Cancel* button, or pressing *Esc* cancels the close and returns you to editing the sample.

You can also cancel by clicking outside the dialogue window.

We don't want to overwrite BellString so click 'Discard' to throw away the sample.

You now know most of the principles for using AudioWorks. You might like to spend some time playing some of the other example sampled sounds included.

You can try the other effects. Remember to click the *Discard* option to avoid overwriting the supplied samples. Take care with the **Save** options in the File submenu as you may accidentally overwrite a sound sample.

The following sections of the manual describe all of the available options in more detail. If you are not familiar with other RISC OS applications, you might also like to read *Appendix B* before trying to operate the program further, to familiarise yourself with the standard options and mechanisms provided in AudioWorks.

Loading and Importing samples

You can load *AudioWorks* and *DataVox* format samples by double-clicking their file icons.

Any file can be loaded as a sound sample by dragging its icon onto the AudioWorks icon bar icon, or into any AudioWorks window.

AudioWorks recognises a number of different file formats, and can import samples in these file formats:

- **AudioWorks**, Filetype bd6 recognised from file content.
- **Acorn Replay Movie**, Filetype ae7, recognised from file content. Acorn Replay Movies contain animated graphics and a soundtrack. AudioWorks extracts the soundtrack (track 1) from the ARMovie file.
- **Amiga IFF 8SVX**, recognised from File content. 8SVX samples can contain instrument samples comprising several samples for different octaves. AudioWorks loads all octaves into a single sample when importing such data.
- **Armadeus**, Filetype d3c
- **Creative Voice File (.VOC)** recognised from File content
- **DataVoxFiletype**, Filetype 108, recognised from file content (type III)
- **Digital Symphony sample file**, Filetype 10a, recognised from file content. AudioWorks cannot load packed (compressed) Digital Symphony samples.
- **EMR SoundSynth**, Filetype df9
- **Microsoft Wave (.WAV)**, recognised from File content. AudioWorks cannot load compressed .WAV files.
- **RISC OS Tracker sample file**, Filetype cb5, recognised from file content
- **Sun/NeXT audio (.snd or .au)**, recognised from File content
- **Voice ModuleFiletype**, Filetype ffa, recognised from file content
- **Raw data**, default if type is unknown

In addition, AudioWorks can extract instrument samples from RISC OS *Tracker*, Amiga/IBM *SoundTracker* and *ProTracker* (and equivalent) music files. These files are recognised if they have filetype **001** or **cb6**. The different *Tracker* file formats are then distinguished by their file content.

AudioWorks can also load any file as 'Raw Data'. This is done automatically if the file format is unknown to AudioWorks. You can also force AudioWorks to do this by holding down *Ctrl* and dropping the file onto the AudioWorks icon bar icon.

Loading stereo samples

When loading stereo samples from disc, AudioWorks has to process the information. It uses the available memory in the computer for this processing. If there is little free memory (less than 32KB), processing will be slower.

Loading sound-samples from (S)Tracker files

It is possible to load Amiga *ProTracker* or *SoundTracker* (15 and 31 instrument versions) and Archimedes *Tracker* (36 instrument) music files into AudioWorks. This does not load the whole tune, but simply allows you to load any of the instruments used in the tune into AudioWorks as sound samples.

This can be achieved in two ways:

- Drag an (S)Tracker file to the AudioWorks icon bar icon. A window appears, listing all the instrument samples contained within the song. Click once on any instrument sample's name to

- load that sample.
- Holding down **Ctrl**, drag the (S)Tracker file onto the icon bar icon. This loads the whole file into a sample window. This includes all of the instrument-samples and the header information and song data.

(S)Trackers are currently recognised by the filetype **Tracker (CB6 or 001)**. You must set files to this type before AudioWorks will attempt to decode them as (S)Trackers.

Often, instrument names in (S)Tracker files are given names to provide a comment and name & address when viewed in (S)Tracker players. This results in odd (or blank) names being given to samples when they are loaded.

Any sample names that appear in the window as "-" are invalid samples; any other samples should be loadable. When saving samples with odd names, check that the default filename given is valid (contains no illegal characters such as "&", "\$" etc, and is of an appropriate length).

Loading other sound-samples

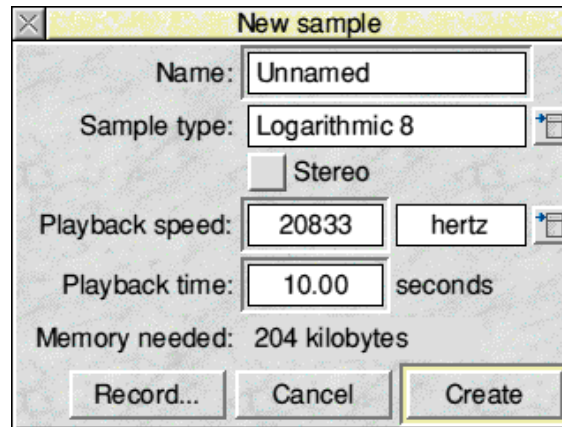
Any other sample, or indeed any other file, may be loaded by dragging it to the AudioWorks icon bar icon. If the file is recognised as being a sample, it is loaded immediately.

If not, you are asked if you wish to go ahead and load it anyway. If you say Yes, you will not be warned if you try to load that type of file again in the same session. Note that some of your data files won't sound very good!

Creating and Recording samples

Creating sound samples

After creating a new, blank sample, you can either record into it or merge parts of existing samples. Choose *New sample* on the Icon Bar Menu. This opens a dialogue box:



You can change any of these parameters after creating the sample. Refer to *Alter* in *The Icon Bar Menu*.

- **Name** is a file name. If you wish, you can specify the name later when using the **Save** options.
- **Sample type**. Click on the menu icon to choose from the four types (*Logarithmic*, *Linear unsigned*, *Linear signed*, *μLaw logarithmic*). These are described in *1. Digital sound samples*. Set the **Stereo** button if you want to create a stereo (two channel) sample.
- **Playback speed**. Type in the required speed. The higher the frequency (or the shorter the sampling rate for *μs delay*), the higher the recorded quality but the greater the memory requirements. The menu on the right lets you choose the units (*hertz*, *kilohertz*, *μs delay*).
- **Playback time**. This is the sample length in seconds.
- **Memory needed**. This is the memory needed to store the sample. It is a function of Playback speed and Playback time. AudioWorks warns you if you try to create a sample that requires more memory than is currently available. You can release extra memory by closing unwanted sample windows and quitting any applications not currently required.

Click on *Create* to create a new empty sample.

Click on *Record* to create a new sample and open the Record dialogue box (described below).

Recording a sample

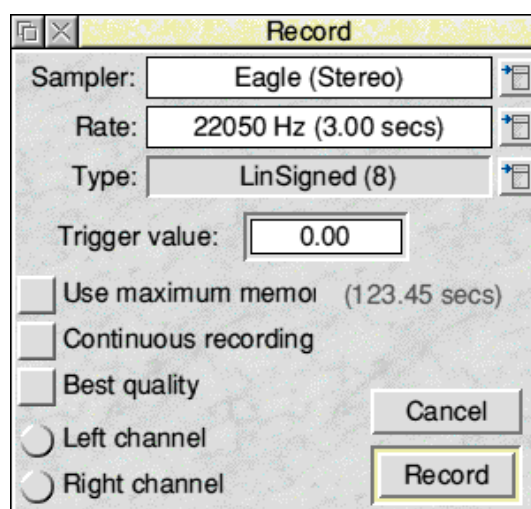
You can only record samples if you have suitable hardware in your computer (such as a Computer Concepts Eagle M2 multi-media card or a Wild Vision Lark card).

To record a sample either

- click on *Record* in the Create sample dialogue box (described above)
or
- click on the *Record* button on a sample window.

The current parameters for the sample may not match those available from the recording source. AudioWorks then uses the closest available parameters.

Either option displays the Record dialogue box:



- **Sampler** is the currently selected recording source. Click on the menu icon for a menu of sources available in your computer.
- **Rate**. Click on the menu icon for a menu of available rates. These depend on the recording source. This also shows the recording time available with the sample and recording source.
- **Type** tells you the sample data format. You cannot change it in this dialogue box. To change it, use the *Alter sample parameters* dialogue box. (See *The Icon Bar Menu* for more details.)
- **Trigger value** (range 0 to 1) lets you delay recording until the amplitude exceeds the trigger value. A value of 0 starts recording immediately.
An example of its use is recording your own voice. If you click on *Record* you might not speak immediately. There is therefore an initial period of silence or just background noise. Setting a suitable Trigger value lets AudioWorks ignore this initial period. It only starts recording when you start speaking and the amplitude exceeds the Trigger value.
- **Use maximum memory** tells AudioWorks to use all the available memory in the computer. (This overrides the value set in **Playback time** in the *Create sample* dialogue box.) The value to the right shows how many seconds of recording will fit in the available memory.
- **Continuous recording**. With this option deselected, recording stops when the sample window is filled.
With this option selected, recording is continuous. When the sample window is full, recording starts overwriting the start of the sample. Click on the *Stop* button to stop recording.
- **Best quality**. With this option deselected, the sample, oscilloscope and spectrum windows (if displayed) show the incoming data. AudioWorks continues to multitask.
Some types of hardware require uninterrupted access to the processor in the computer or they lose data. (This is more critical at high sampling rates, such as 44kHz.) If AudioWorks warns you that recording has lost data, retry with **Best quality** selected. During recording an information box is displayed and multi-tasking is disabled. Press *Esc* to abort recording.
- **Left channel/Right channel**. These are greyed unless you have selected a stereo (two channel)

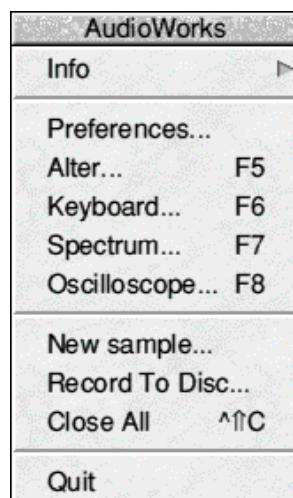
source and a mono (single channel) sample window. They let you select which channel of the source to record.

If you want to record both channels and produce a mono output and your sampler does not have a mono option, you should

- Record a stereo image and then...
- Merge the two channels using **Make mono** in the *Utilities* menu...
- Click on *Record* to start recording.

The Icon-Bar Menu

Clicking **Menu** over the icon-bar icon displays this menu:



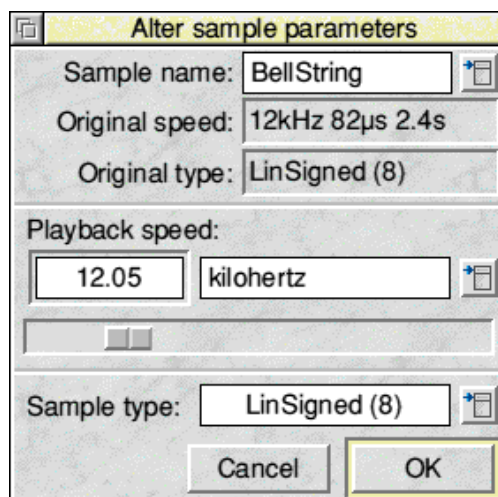
Info

This gives general information about AudioWorks. The most significant item is **Version**. If you contact Computer Concepts with a query about AudioWorks, you may be asked for the version number.

Preferences...

Clicking this brings up the preference options. These are detailed later.

Alter...



This dialogue box refers to the current sound sample. To change to a different sample, click on the menu icon to the right of **Sample name** . This displays a menu of samples currently in memory.

Playback speed

Lets you alter the playing speed. It does not alter the sample. (Use the *Resample* option to change the sample.) There is more information on playback speed in *Tutorial*.

The speed can be entered in the usual units of *hertz*, *kilohertz*, *microseconds delay*, and two new options:

- **Secs playtime** This alters the play speed so that the sample plays in the specified number of seconds. This also changes the pitch of the sound.
- **Times current** The editable field contains a multiplier of **Original speed**. Thus, for a 12kHz sample, enter **0.5** to halve the play speed to 6kHz, or **2.0** to double it to 24 kHz.

Changing between the different options converts the value in the editable field to the nearest equivalent. For example, a value of 12kHz is changed to 166 μ s if you change the units to *μ s delay*.

You can alter the value by:

- typing into the editable field,
- dragging the slider,
- pressing **-** or **←** to change the value in 1Hz steps,
- pressing **Shift -** or **Shift ←** to change the value in 10Hz steps,
- pressing **Ctrl -** or **Ctrl ←** to change the value in 100Hz steps,
- pressing **+** or **→** to change the value in 1kHz steps.

You may find that samples play too fast. Reduce the speed slightly to hear the sample correctly.

Sample type

Lets you change to a different sample interpretation (*Logarithmic*, *Linear Signed*, *Linear Unsigned*, or *μ Law Logarithmic*) and format (8, 12, or 16 bits per sample).

The alter window has an "instant effect". That is, you can alter a sample's play speed or sample type even while it is playing. Click **OK** to make the change permanent or **Cancel** to revert to the previous settings,

If an imported sample sounds like radio-static, it is probably being played with an incorrect sample format. By choosing a new format from this dialogue box, you can usually find a format that 'looks right' in the sample display, and sounds much better.

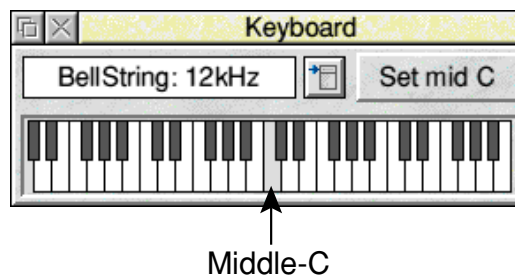
Discriminating use of the alter window allows you to load just about any foreign sample and play it correctly, even if AudioWorks is unable to understand the sample file format.

Advanced use:

If you drag a file into this dialogue box to load it, then its type and play speed changes to the current settings, regardless of the settings saved in the file. This is a convenient way of loading a group of samples in a format unknown to AudioWorks, yet still default to the correct play speed and type.

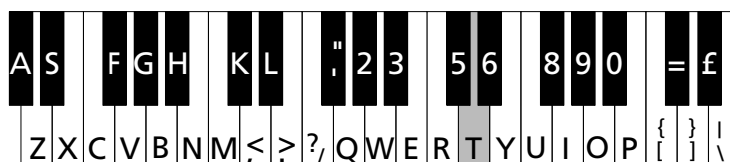
Keyboard...

This option displays a piano keyboard.



If you have any samples loaded, the name of the current sample and its current play speed (in kilohertz) is displayed. As usual, you can change to a new sample by clicking on the menu icon and choosing a new sample.

You can play the keyboard either by clicking on it or by typing:



(For middle-C, press *T* or *Space*.)

If there is no sample loaded you can play the keyboard as a normal keyboard.

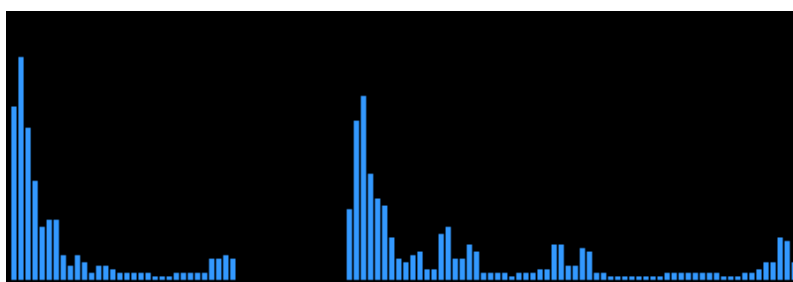
If there is a sample loaded:

- click on the keyboard to play the sample at different pitches, or
- hold down *Shift* to play the keyboard.

Set mid C sets the play speed of the sample to the pitch of the last note you played with the keyboard.

Spectrum...

This opens a spectrum analyser window, which shows a real-time frequency-spectrum while a sample is playing. This operates upon the last sample that you played (or altered the speed of).



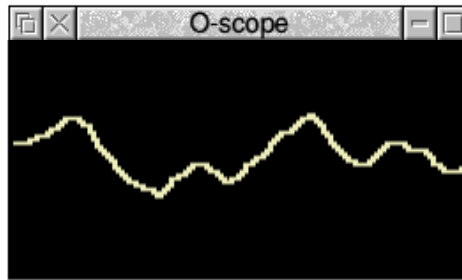
Clicking the Full icon (in the top right corner of the window) doubles the window size and doubles the number of frequencies displayed. However it also makes the update slower. (This is only a problem on Archimedes A300 and A400 series and A3000 computers fitted with ARM2 processors.) On ARM2 machines, the spectrum analyser is more useful if you turn the playback speed down, and quit from all those small applications that suck up desktop time (clocks and other constantly-updating displays are usually the prime culprits).

Closing the Oscilloscope (see below) also slightly speeds up the spectrum analyser. Pause a sample during playback if you wish to study the window for a longer time.

The size of the spectrum window is saved when you save the preferences. You can thus set the default size of the window by opening it to the size you wish and then saving the preferences.

Oscilloscope...

This window works in a similar fashion to the Spectrum window. It displays the waveform being played, like a conventional oscilloscope.



It runs faster if the Spectrum window is closed. As with the Spectrum window, the default size is saved when you save the preferences.

New sample

You can also open this dialogue box by **Select**-clicking on the AudioWorks icon on the icon bar.

This dialogue box is described in *Creating and Recording samples*.

Close All

This option is equivalent to closing the windows of all unmodified sound samples. It is convenient when browsing through a large number of samples (for example when searching your SoundTracker music collection for interesting samples) as you can load many samples in one go, check through them, then discard them all with one easy keypress.

Note that it only closes *unmodified* samples, and does not close tool windows such as Alter and Keyboard. It also hides the clipboard if this is showing.

Quit

When you have finished using AudioWorks, choose Quit from this menu. If you have not saved some of your sound samples, AudioWorks checks if you are sure you want to quit.

Preference options

Either

- choose **Preferences...** from the icon bar menu, or
- **Adjust** -click on the icon on the icon bar.



Each option represents a different preference category.

Also on this window are two buttons,

- **Save** which saves the current settings as the new defaults, and
- **Restore** which reloads previously saved preferences.

Device preferences



Playback volume

Drag the slider bar or press the + or - keys on the keyboard to set a suitable playback volume level. This has an instant effect so you can change the volume while samples are playing.

Click on *OK* to make the change permanent.

Click on *Cancel* or close the window to return to the previous value.

Stereo separation

This lets you adjust the stereo separation. 0 is no stereo effect; 100% is maximum. The best value is a matter of personal preference.

Playback device

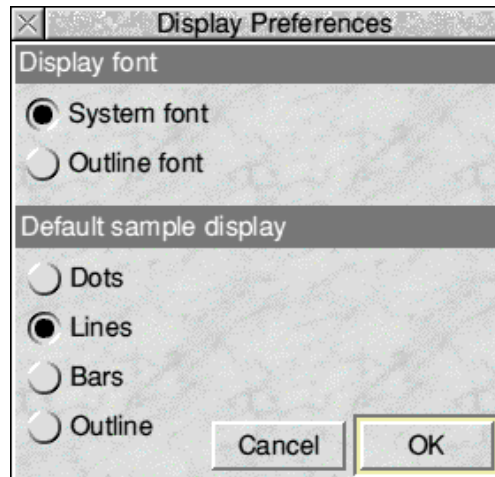
This selects the device used to output the sample. Click on the menu icon for a menu of available devices.

Internal is the computer's internal sound hardware and speaker. The maximum volume from the internal speaker is set by the operating system command *Configure SoundDefault or, in RISC OS 3, *!Configure*. (See the *User Guide* supplied with the computer for further details.) **Playback volume** controls the volume up to the maximum allowed for the output device.

Recording device

This lets you change the default recording device. Select a device from the menu and click on *OK* to change the default.

Display preferences



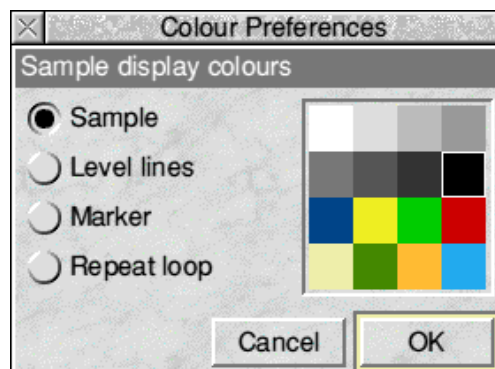
AudioWorks dialogue boxes and windows can use either

- the standard Acorn system font, or
- an outline font. Outline fonts are more aesthetically pleasing but slightly slow down screen redraws.

You must save the preferences and then re-run AudioWorks before a new display font setting takes effect.

You can also set the default display style (*Dots*, *Lines*, *Bars*, or *Outline*). Any change applies when you open new windows. It does not apply to currently displayed windows.

Colour preferences



This lets you change the colours used to display items in the sample window. To change a colour, click on the appropriate radio button and choose the new colour from the palette. Click on *OK* to make the change.

Miscellaneous preferences



Multitasking timeslice

Multi-tasking allows the computer to run several applications simultaneously. Normally, each application runs for a short period of time (a *timeslice*) and then suspends. Another application can then run for its timeslice. Sometimes an application requires uninterrupted use of the processor and it temporarily stops multi-tasking. This happens most often during printing. (This is a very simplified description of time-sharing.) This option allows you to fine-tune multi-tasking by the AudioWorks application.

The default value (15 centi-seconds, 0.15 seconds) is recommended, as the desktop responds quickly to your clicks and keypresses. Reducing the timeslice allows more time for other applications (which run faster) but processing in AudioWorks takes longer. Increasing the timeslice slightly improves the performance of AudioWorks but may make your desktop jerky and unresponsive.

Country/Language

Messages are held in a separate file within AudioWorks. Changing the language used just involves changing to a different message file. Click on the menu icon to display a list of language files.

To use a different language, save the preferences and then re-run AudioWorks.

Stereo samples

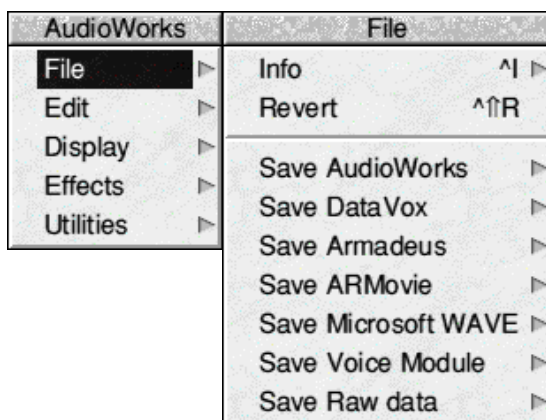
This is similar to **Link channels** in the Utility menu except this option lets you specify the default setting.

The Sample Menu

Click **Menu** over the sample window to display the sample menu.

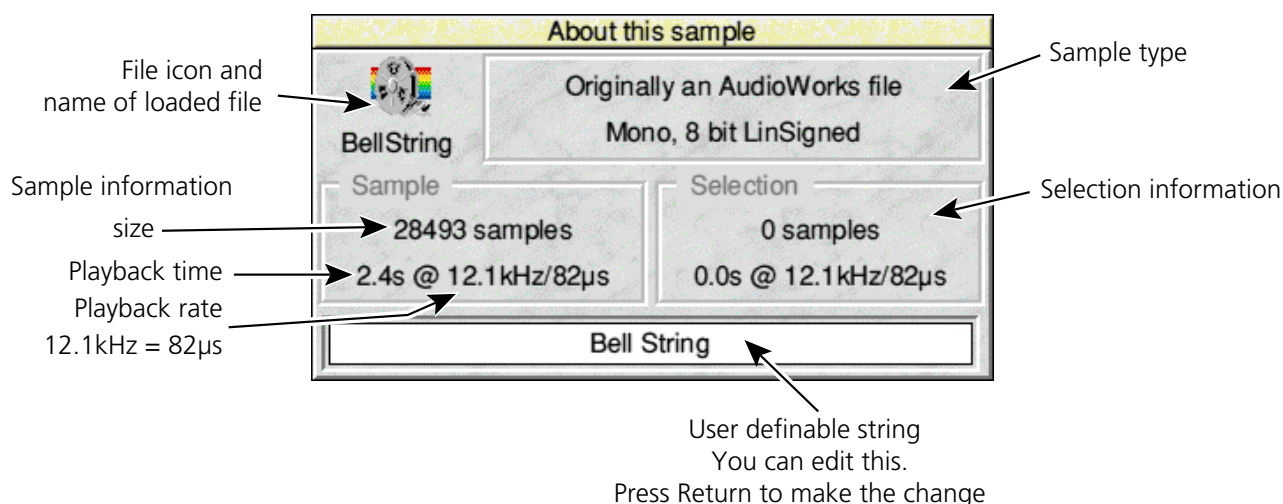
File

This menu gives information on the sample, or lets you save the sample in different formats.



Info

This displays the name of the sample file, the original (when loaded) type of the file, the sample format (for example, Mono, 8 bit LinSigned)



The user definable comment string displays any comment saved in the file (if available) or from AudioWorks as to sample's origin (for example, *Extracted from the Acorn Replay Movie file 'Movie'*). You can edit this field; press **Return** to set the new comment.

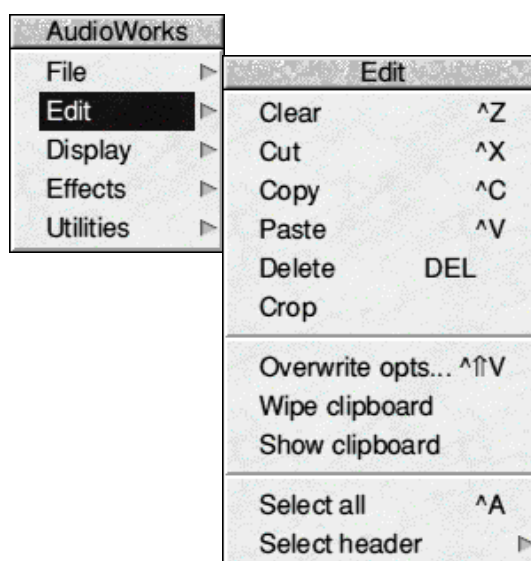
Save sample

These menu options allow saving/exporting of samples in different formats:

- **AudioWorks** The native AudioWorks file format.
- **DataVox** and **Armadeus** Two popular file formats on Acorn computers. Note that these file formats are limited (*DataVox* cannot represent 12 bit samples, *Armadeus* cannot store anything other than mono 8 bit Linear Signed samples), so they are not recommended unless you specifically wish to export in these formats.
Some formats cannot save stereo samples that can be played in the background.
- **Microsoft WAVE** The most common format on PCs.
- **Voice Module** Saves a relocatable module that can be used by Audio Manager (supplied with AudioWorks). Samples are saved in 16-bit mono format. You require technical knowledge of Acorn computers to make full use of Audio Manager.
- **Raw Data** This saves the sample data without any header information at all. Stereo samples are stored as two separate chunks of data - left channel then right channel.

When saving stereo samples AudioWorks uses the computer's memory to process the data before writing to disc. If your computer has little free memory (less than 32KB), processing can be slow.

Edit



Clear

This deselects any selected region.

Cut/Copy/Paste/Delete

AudioWorks provides you with a very powerful clipboard-based cut/copy/paste editing system. The clipboard in AudioWorks is similar to a conventional clipboard. That is, you place items on it for temporary storage. The clipboard can only store one item; placing a new item on it overwrites any existing contents.

The selected region of a sample can be:

- **Cut** to the clipboard. This removes the selection from the source and stores it on the clipboard.
- **Copied** to the clipboard. This places a *copy* of the selection on the clipboard for later use. The original (source) sound-sample is unchanged.
- **Deleted**. No copy is kept - use this option with care.

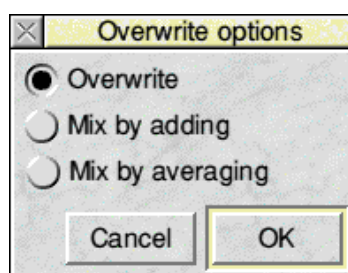
Once you have some data on the clipboard, you can **Paste** from the clipboard. The clipboard contents are preserved so you can paste several times if wished.

Paste either

- inserts the data from the clipboard into the current sample/channel at the cursor or
- overwrites the selected region.

This discards all of the sample outside of the selected region. This has a keyboard short cut of *Shift-Delete*.
Overwrite options

These control the precise action of pasting.



Options set in this dialogue affect future paste operations that overwrite the selection. They have no effect

when pasting at the cursor.

- **Overwrite** The data from the clipboard overwrites (replaces) the selected region.
- **Mix by adding** This mixes the clipboard and selected region sound-samples by *adding* the two samples.

This increases the volume of the resultant sample. With large amplitude samples, this can result in overflow (or clipping) which reduces the quality of output. If this may happen, we recommend using *Mix by averaging*.

- **Mix by averaging** This mixes the clipboard and selected region sound-samples by *averaging* the two samples.

The mix is quieter than with adding, but ensures that no overflow occurs and usually gives much better quality results. *To maximum* (in *Effects*, *Amplify*) can be applied after this type of paste operation to improve the volume levels. Wipe clipboard

This erases the current contents of the clipboard. This is useful if you want to release more memory for use by AudioWorks or other applications.

Show clipboard

This displays the clipboard. You can then treat its contents as a normal sample. (Click on the clipboard window's Close icon to hide the clipboard again. The clipboard's contents remain unchanged.)

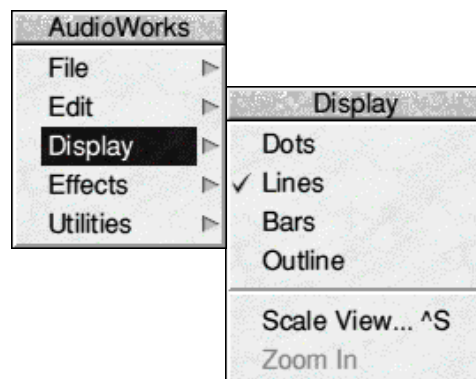
Select all

This provides a quick way of selecting the entire current sample. This is useful if you want to copy or overwrite the sample. (Select all has a short cut of *Shift-click*.)

Select header

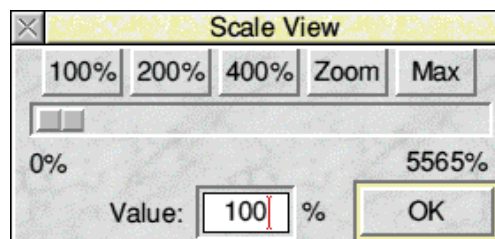
This selects the header information at the start of the sample. You can then strip headers from samples of a type unknown to AudioWorks. An editable field lets you specify the number of bytes in the header. (The default is 32 bytes.)

Display



This lets you display the sample in *Dots*, *Lines*, or *Outline* modes. Using different display modes can sometimes show features of a sample that are otherwise obscured.

Scale View



This dialogue box offers a quick method of changing the magnification at which the sample is displayed. The icons along the top of the window allow you to

- set the display scale to 100%, 200% and 400%,
- zoom in on the selected region
- zoom to the maximum level possible. (You should be able to select individual samples. This depends on the setting of Mouse Speed - refer to the User Guide supplied with the computer.)

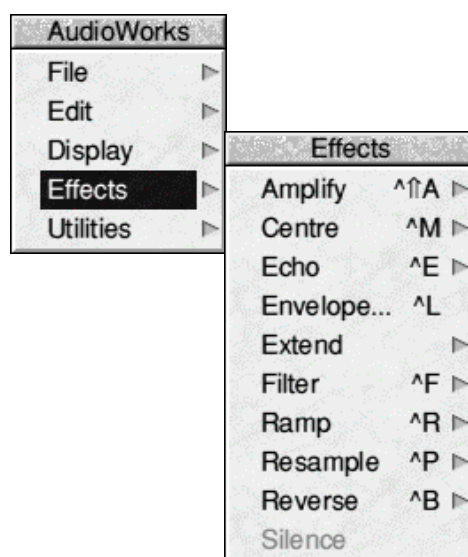
You can also use the slider to change the scale factor. This has immediate effect.

You can also type a new value into the editable field and click OK .

Zoom in

This duplicates **Zoom** on the Scale view dialogue box. That is, it zooms in on the selected region.

Effects

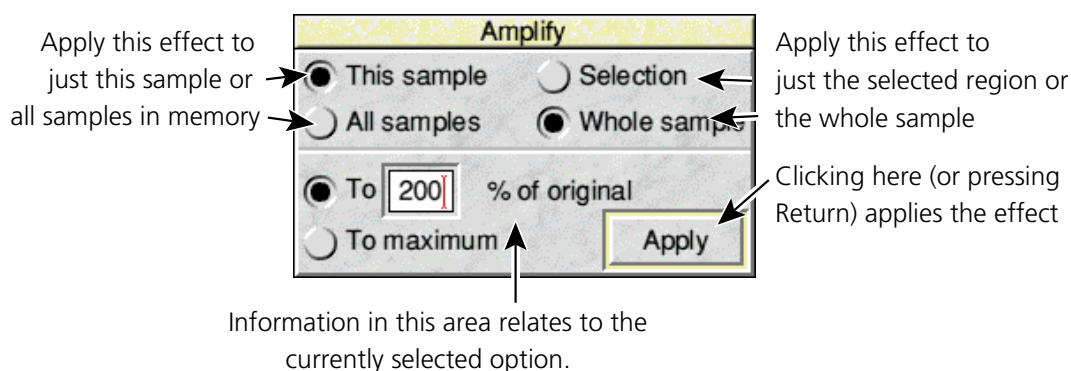


This offers the main editing functions of AudioWorks. Most options share a common layout, with three parts:

Amplify

This amplifies the sample (increases the volume). Two options are available:

- Amplify by a percentage. (For example, 50% halves the overall volume level, 100% leaves it unchanged, and 200% doubles it), and
- Amplify to maximum (in which case AudioWorks amplifies the sample as much as possible without introducing distortion).



Centre

This allows you to shift the sample up or down in the sample display window. This is usually used to correct badly sampled data. Three options are available:

- **Move to Marker** This moves the sample so that the portion currently lying on the centre-line shifts to the position indicated by the red marker line.
- **Auto-centre** This takes the average sample value as the new centre value and shifts the sample up or down as necessary.
- **Add** This allows you to add or subtract any constant value to/from the sample (which shifts it up/down respectively). The value entered should be between -1.0 and +1.0. Echo

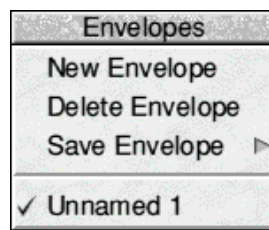
This adds an echo. Delay is a time in seconds between each successive echo. Attenuation is how much quieter the echo is than the original. 0% is no attenuation; 99% the greatest attenuation.

As the echoes carry on beyond the original end of the sample, there is an option to automatically extend the sample so that the echoes are not 'chopped off' at the end of the sample. This is optional to allow you to extend the sample if/as you see fit before applying the echo.

Envelope

This is a somewhat more complex option. It brings up an envelope editor window, which applies to the current sample. You can change to a different sample by clicking over the sample name in the top left of the window. Up to eight envelopes may be loaded and edited at any time.

Clicking **Menu** on the window displays a submenu:



Use this to Create, Delete or Save envelopes and select which envelope to display in the window.

The window displays the normal level lines and a grey display of the current sample. On top of this is the envelope, represented by red handles and black lines.

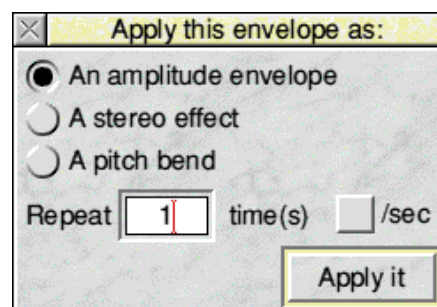
Click **Select** to add a point to the envelope.

Hold down Shift and click on a point to delete it.

Adjust-drag a point to move it.

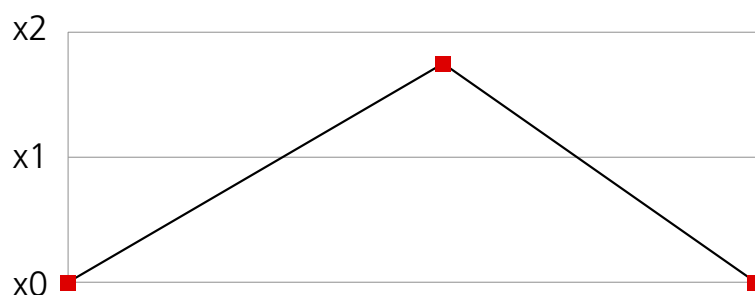
The envelope represents scaling factors, with zero at the bottom and x2 at the top. The centre line (x1) represents no change.

To apply the envelope click on Apply. This displays a small dialogue box:



Select the required option and then click on Apply it.

- **Amplitude envelope** This scales the amplitude (volume) of the sample. The following envelope shape would make the sample 'fade in' from silence, and then 'fade out' again to silence.



- **Pitch envelope** This scales the pitch (by resampling) according to the envelope shape. The example envelope shown above starts the sample off at a low pitch, gradually increasing past its current pitch, until it is playing faster than normal, then decreasing in speed until it is once again playing slowly.

Values less than x1 increase the size of the sample and so require more memory. (Values greater than x1 require less memory.) AudioWorks uses a minimum value of x0.1 - this prevents samples becoming excessively large. You can set values down to x0 but AudioWorks rounds these up to x0.1.

Extend

This allows you to extend a sample, specifying the amount to extend by or the new size to which the sample should be increased, in terms of either number of samples or number of seconds playback.

Filter

AudioWorks has two filters -- Low pass and High pass. Low pass removes all frequencies **above** the specified value. (That is, it 'passes' frequencies lower than the value.)

High pass removes frequencies **below** the specified value.

Ramp

This provides a quick and easy method of 'fading in' and 'fading out' parts of a sample. Four different ramp shapes are provided, in both ramp up (start at silence and fade in) and ramp down (start at full volume and fade out). For more control of the ramp shape, use an Amplitude envelope (described above).

Note that cross-fades (fading one sound out as you fade another one in) can be achieved by using Ramp/Envelope, and then mixing using the copy/paste mechanism.

Resample

This allows you to change the size of a sampled sound while keeping it playing at the same apparent pitch. The new size of the sample can be entered in terms of number of samples, a multiplier of the current size, or a hertz playspeed.

Reverse

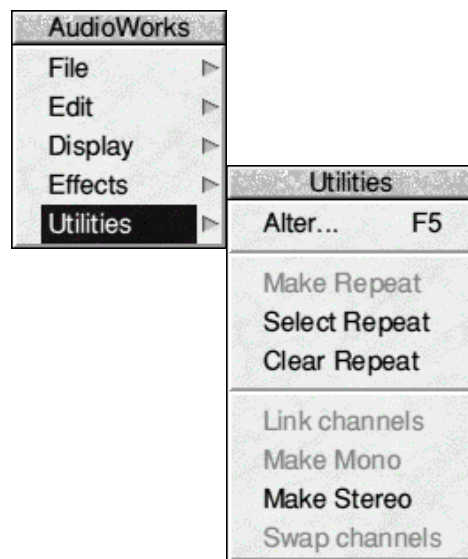
This effect reverses the sample or selection so that it plays backwards.

Silence

(Only available when there is a selection)

This overwrites the selected region with silence. AudioWorks will ask for confirmation before overwriting.

Utilities



Alter

This opens the Alter dialogue box. This option is similar to **Alter** on the icon bar menu, except that this option lets you open the dialogue box for any sample in memory. **Alter** on the Icon Bar Menu opens the dialogue box for the current sample.

Make Repeat

(Only available when there is a selected region.)

This replaces any existing repeat loop with a new loop based on the selected region. The auto-repeat button is also turned on for convenience. There is more information on repeat loops in Tutorial.

Select Repeat

This sets the selected region to the repeat loop region, making it easier to adjust. You can use **Adjust** to alter the start or end point of the region.

After adjusting the selected region click on **Make Repeat** to create a new repeat loop.

Clear Repeat

This clears any repeat loop from the sample.

Link channels

(Only available with a stereo sample.)

This treats both channels as a single entity. (That is, selecting a region applies to both channels, effects apply to both channels, and so on.) However, by deselecting **Link Channels**, the two channels are generally treated as two separate mono samples.

You can make linked or unlinked the default setting using **Link channels** in the Miscellaneous preferences dialogue box. (See Preference options for more details.)

Make mono

(Only available with a stereo sample.)

This converts a stereo sample (two channel) into a mono sample by mixing (averaging) the two channels.

Make stereo

(Only available with a mono sample.)

This converts a mono sample into a two channel stereo sample by duplicating it to produce identical left and right channels.

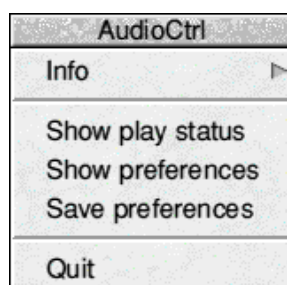
AudioCtrl

This application has two functions:

- as an alternative to *!AudioWrks* for playing samples, and
- to set up system parameters.

The Icon Bar Menu

Click **Menu** on the icon on the icon bar to display this menu:



Info

This gives you information about AudioCtrl.

Show play status

This tells you the name of the sample currently playing and play progress. (Described below.)

Show preferences

See *Setting system parameters* (later in this section).

Save preferences

See *Setting system parameters* (later in this section).

Playing samples

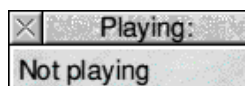
If you just want to play samples and not manipulate them, you can use *!AudioCtrl*. Its advantage is that it is smaller than *!AudioWrks* and so requires less memory when running.

You can *play AudioWorks, DataVox* and *Armadeus* samples by:

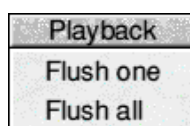
- dropping them onto a AudioCtrl window,
- dropping them onto the AudioCtrl icon on the icon bar, or
- for *AudioWorks* files, double-clicking on the sample's file icon.

You can load several samples. AudioCtrl queues them and plays them in sequence.

Adjust-click on the AudioCtrl icon on the icon bar or choose **Show play status** to display play progress.



Click **Menu** on the display for a menu:



Flush one lets you stop the current sample. AudioCtrl then plays the next sample (if any) in the queue.

Flush all clears all samples from the queue.

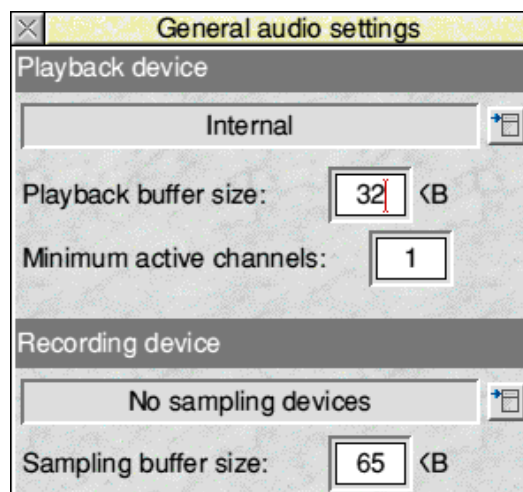
Setting system parameters

Click on the AudioCtrl icon on the icon bar or choose **Show preferences** to display the preferences window.



General and *Events* always appear in the window. There may be other options to the right (such as *Eagle*) depending on the hardware fitted in your computer. Refer to the documentation supplied with the hardware for information on these options.

To make the current settings the defaults, choose **Save preferences** .
General



Recording device

This is similar to *Playback device* in AudioWorks preferences except that this sets the default device for applications other than AudioWorks. *Internal* is the computer's internal speaker.

Sampling buffer size specifies the amount of memory used for playing samples. Some desktop operations (for example moving windows) can stop AudioWorks and AudioCtrl from writing data to the playback buffer. If the buffer empties, the sample stops playing until more data is written to the buffer. The default value gives about 1.5 seconds of playing time for 20kHz, 8 bit samples. Larger samples such as 44kHz, 12 or 16 bit may require a larger buffer.

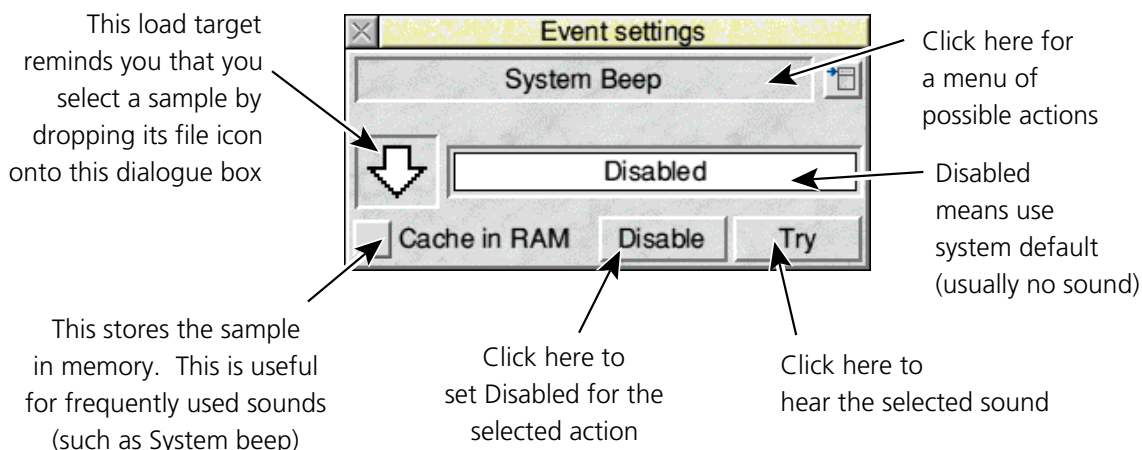
Minimum active channels. The computer can have up to eight channels open. However, as you open more channels, the overall volume gets less. You would need to set this value to more than 1 for these reasons:

- Some applications require a minimum number of channels to be available (usually two or four). If you have AudioWorks or AudioCtrl running, other sound sample applications may work better with more channels kept open. Check the documentation for the application to see if there is a minimum number of channels specified.
- As described above, opening more channels reduces the volume of each channel. If you are playing multiple samples you may find the volume varies. Always having several channels open gives a more consistent volume.

This parameter only applies to the computer's internal sound hardware. It has no effect on external hardware.

Events

This lets you associate sounds with various actions on the computer such as selecting menu options and closing windows. You can also redefine the standard System beep.



To associate a sound sample with an event:

1. Click on the event name field. This displays a menu of possible events. A tick appears against events that already have samples associated with them.
2. Choose an event from the menu. The dialogue box shows its name and the name of any sample currently associated with it. *Disabled* means that no sample is associated with the event.
3. Drop the file icon for the sample onto the dialogue box.
4. If you want to hear the sample, click on **Try**.
5. For common events such as system beep click on **Cache in RAM**. This stores the sample in memory. The computer can get the sample more quickly from memory than it can from disc.

If you do not have a sound event attached to system beep, you may find the system beep plays at the same time as some other events.

You can quit AudioCtrl at any time and all events remain active.

If you later want to remove the sound from an event:

1. Load AudioCtrl if not already loaded.
2. Choose the event name from the menu.
3. Click on **Disabled**.

Your computer can start up using these sound samples if you:

1. Save the current preferences.
2. Include *!AudioCtrl* in the computer's boot sequence. Refer to the *User Guide* supplied with the computer for details.

Appendix A: Mouse & Keyboard quick-reference

Mouse effects

- Any click in a sample window makes it the current sample (the title bar goes yellow; a red dot appears in the top left corner of the window, and editing actions apply to that sample).
- A **Menu** click anywhere in a sample window, or on the icon bar icon, brings up an appropriate menu.
- Holding down *Ctrl* and clicking anywhere in a window brings it to the front.
- Holding down *Ctrl* and dropping a file on the icon bar icon loads the file as raw data.

Selection

- A single click on a sample deselects the selection and positions the cursor at the click.
- A *Shift*-click selects the whole sample.
- Dragging on the sample: with **Select** sets selection, with **Adjust** adjusts selection.

Keyboard short cuts

Delete Delete selection.

Note that this does **not cut** to the clipboard, it **irrevocably deletes** the selection.

Shift-Tab If you have several sample windows open, this lets you easily switch between them. **+** - Increase or decrease value set by slider in current dialogue box.

Control-keys

Ctrl-A select All
Ctrl-B reverse (Backwards)
Ctrl-C Copy selection to clipboard
Ctrl-E Echo
Ctrl-F Filter
Ctrl-I sample Info
Ctrl-L envelope
Ctrl-M centre (Middle)
Ctrl-P Resample (alter Pitch)
Ctrl-Q Close current window (*StrongEd* convention)
Ctrl-R Ramp
Ctrl-S Scale view
Ctrl-U Clear writable icon
Ctrl-V Paste selection from clipboard
Ctrl-X Cut selection
Ctrl-Z Clear selection
Ctrl-Shift-A Amplify
Ctrl-Shift-C Close all unmodified samples; hide the clipboard
Ctrl-Shift-V Overwrite options dialogue box
Ctrl-Shift-Z Close current window (*Impression* convention)
Ctrl-F2 Close current window (*Edit* convention)
Ctrl + Double view scale
Ctrl - Halve view scale
Ctrl Left Arrow Select to start of sample
Ctrl Right Arrow Select to end of sample

Function keys

	<u>normal</u>	<u>with Shift</u>	<u>with Ctrl</u>
F1	Play selection	Play entire sample	Show sample info
F2	Stop play	-	Close current window
F3	Save as Audio	WorksSave as DataVox	Save as Armadeus
F4	-	-	-
F5	Show Alter window	-	-
F6	Show keyboard window	-	-
F7	Show spectrum window	-	-
F8	Show oscilloscope window	-	-
F9	Toggle This sample/All samples	-	-
F10	Toggle Selection/Whole sample	-	-

Other short cuts

Dragging any file to any window attempts to load it. If the filetype is unrecognised by AudioWorks, it pops up a window asking if you are sure you want to load it. (If you say Yes, AudioWorks does not ask about that file type again during this session, as it assumes you know what you are doing.)

Note that the effect of this type of loading is slightly different when the icon is dragged to the **Alter** window or sample windows:

- to the **Alter** window - sets the type and playspeed of the sample as it is loaded to the settings in the Alter window.
- to a sample window - pastes the file into the current sample using the current overwrite options (if overwriting the selection). This operation wipes the clipboard.

Here are just a few of the other products you will be able to
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