Audio Box

Micro composer

Audio Box is an all in one recording studio and sound creation tool for your Pocket PC, ideal for creating your own musical compositions without the need for dedicated hardware. Inspiration doesn't always strike whilst sat at your PC, so if you're a musician looking for a quick way to lay down your ideas or want to create complete compositions then this is the only package you need.

The Pocket PC alone does not have the ability to play standard MIDI files. This is because it lacks the necessary hardware support in the form of Wavetable synthesis necessary to achieve this. This means that at best you are limited to playing simple WAV and MP3 files. Audio Box solves this problem by allowing you to create your own virtual instruments which are fully configurable. Audio Box allows you to emulate the sound of classic synthesisers which became widespread in the 80's and are still at the heart of modern music today. Customise the sounds to match your style of music or use the presets, it's up to you! Audio Box also comprises a digital sampler, a dedicated multitimbral string pad synthesizer and a drum machine allowing you to create your own customised drum kits.

Of course having the ability to generate sound is not everything… Audio Box is a complete music composition package with both track and score editing. The interface is simple to use, and yet provides a comprehensive range of features..

Audio Box allows you to create up to separate 16 tracks, each track assigned it's own instrument. An integrated mixing desk allows you to control the overall mix as well as assign multiple effects to each channels.

Audio Box also features the ability to automate instruments, effects and the mixer using custom controller messages sent from the sequencer.

Audio Box has the ability to work in high quality 44Khz mode or 22Khz mode for some slower models of Pocket PC. The polyphony and number of effects are only limited by the speed of your Pocket PC, so there is nothing to hold you back!

Hardware Keys

The four hardware buttons on your Pocket PC are assigned various functions which are required in order to use Audio Box. The location of these buttons may alter from one model of Pocket PC to another.
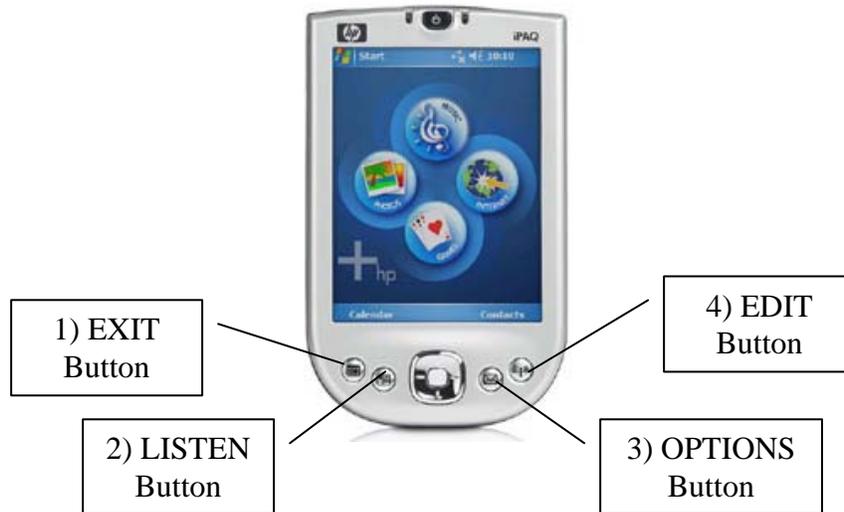
1) The EXIT button allows you to exit Audio Box.

2) The LISTEN button is used to hear a note from the voice assigned to the active track. You can use this key to monitor the changes made whilst editing sounds. The note produced is A-440Hz.

3) The OPTIONS button displays a menu of various program options which can be enabled or disabled. These options are as follows:

Follow Song: When turned on will ensure that the screen scrolls to keep up with playback of your song. Turn this off when you wish to edit your song with loop points set to stop the screen scrolling.

Loop Mode: Turns on loop mode. When enabled this causes playback of a specified range of your song to be continuously repeated until you press 'Stop'.. This mode is used in conjunction with loop start and loop end markers which are discussed elsewhere in this manual.

Solo Track: Toggles solo mode on/off for the selected track. Solo mode disables the output of all other tracks except that of the selected track. Use

this to listen to the selected track in isolation. It is often useful to place a track in solo mode when adjusting effects or setting up instruments.

Mute Track: Toggles mute mode on/off for the selected track. When a track is in mute mode it does not output any sound. This is useful when mixing or listening to selective tracks.

Metronome: Toggles the metronome on/off. You can control the metronome volume from the Preferences window.

4) The EDIT button displays a menu of options associated with score editing. These options are discussed in the score editing section of the manual.

The Direction Pad

The direction pad can also be used during editing and has the same functionality as the scroll bars (in track and score modes). The 'START' button located in the centre of the direction pad can be used to start and stop playback. This is handy on screens where the transport bar isn't available.

The interface

Audio Box has a tab system to move between various sections of the program. There are five main areas to the program which are accessible from the tab bar at the bottom of the screen.

1) Track editor.
2) Score editor.
3) Voice / Instrument assignment.
4) Mixer settings.
5) File / Preferences.
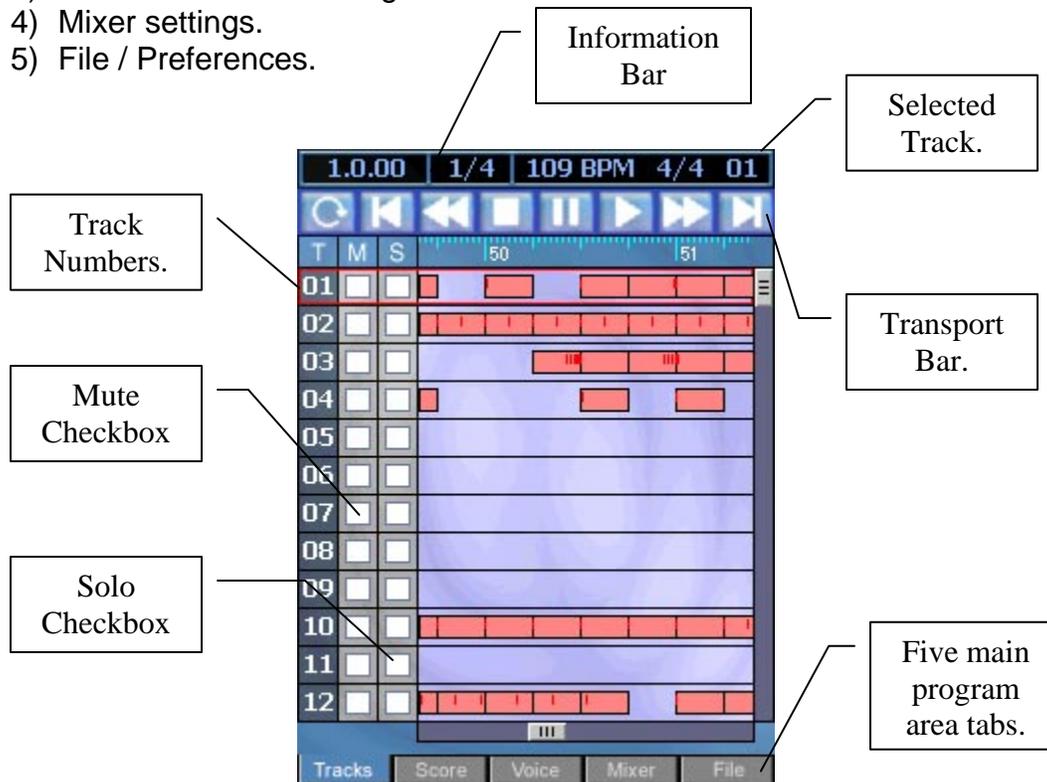
The Information Bar

The information bar appears at the top of the screen in both score and track modes and displays information that is relevant to your composition.

At the very left of the information bar is the song position counter. This gives you an accurate reading of the position of the play cursor within your song. As the song is played this with change to reflect the current bar, beat and 1/8 beat of the cursor.

The next option is the 'Note/Duration Length'. Tapping the screen over this value displays a popup menu with various fractional bar values. By default this is set to

¼ bar. The way this value is interpreted depends on what you are doing. If you are adding notes in score mode then this refers to the note length of newly created notes. If you are in track mode this refers to the note grouping size used to display track data. This is also used as a snap value when dragging notes and blocks of data.

The tempo comes next and as default is set to 140bpm. This can be changed by tapping on the display and selecting a preset value from the popup menu or picking the 'User Defined' option to specify a custom value.

The time signature comes next. By default it is set to 4/4 which is standard for most compositions.

And finally the active track number. Tapping the stylus on this item displays a menu of tracks from which you can select the active track. You can also change the active track using the UP and DOWN direction keys.

The Transport Bar

The transport bar is used to navigate your way around your composition and the way to start and stop playback.

The buttons are as follows from left to right:-

1) Loop Mode.
2) Go to start of song.
3) Rewind.
4) Stop.
5) Pause.
6) Play.
7) Fast Forward.
8) Go to end of song.

Most of these are pretty self explanatory except for Loop Mode. Normally when you press the play button the song plays from the current cursor position, only stopping when you hit the end of the song. Loop mode works in conjunction with a set of loop points which specify an area of the song which is to be played in a continuous loop. This is very handy for song construction as you can lay notes whilst a song is playing.

The Track Editor

When you first run Audio Box you will be presented with an empty project and the program will default to track editor mode. This screen shows an overview of all individual tracks on a single screen and is where you select the track you wish to work with. Tapping your stylus on the track number makes that track the currently selected track. The RED rectangle surrounding a track denotes the currently selected track. You can also use the UP and DOWN keys on the direction pad to move between tracks. In track and score modes the current track number is also displayed in the top right of the information bar.

Audio Box allows you to use up to 16 tracks, but only 12 are viewable on screen at any one time. Use the vertical scroll bar or the UP / DOWN keys to scroll the display.

The Timeline appears beneath the information and transport bars, and is available in both track and score modes. This gives you an accurate position of where the on screen data appears within your song. When in play mode the playback cursor will appear on as a vertical red line which will scroll along as your composition plays. The timeline can be used to read the play position within your composition.

The track editor has some functions which are unique to this display mode which are as follows:-

Mute: To the right of the track is the 'Mute' checkbox. Tapping this checkbox toggles mute mode for the selected track. When a track is in mute mode it does not output any sound. This is useful when mixing or listening to selective tracks.

Solo: Next to the 'Mute' button is the 'Solo' button. This is used when you need to hear a single track in isolation. It is often useful to place a track in solo mode when adjusting effects so you can clearly hear parameter changes or effects.

Track mode is simply a convenient way of displaying an overview of the musical score, but can also be used for duplicating and moving sections of your composition. Notes are grouped into chunks for easy manipulation. You can change the size of the chunks by modifying the 'Note Length' property by clicking on the Information bar as follows:-

Note Length Menu

Note Length / Selection Menu.

Track Data in one bar chunks
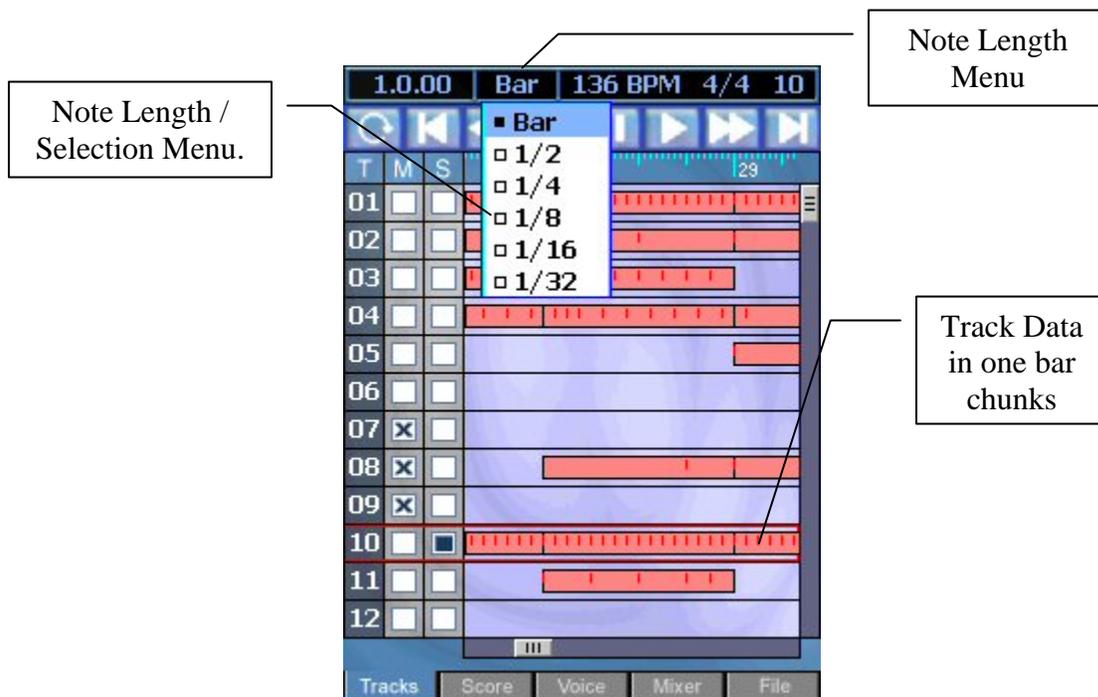
Moving and Copying

You can easily move and copy chunks of your song from one bar location to another in track mode using cut, copy and paste. Simply click on a chunk to select it, when selected the chunk will turn blue. You can also drag a rectangle around a group of chunks using your stylus. As previously mentioned the size of the chunks is determined by the 'Note Length' menu. It is often handy to change this setting to 'Bar' in order to select bar length chunks of notes.

Once you have selected a group of chunks they can be moved by tapping and holding a selected chunk and dragging the stylus across the screen. This drag method is useful for moving data from one track to another or for moving sections of your composition from one location to another.

If you need to move sections over several bars it may be easier to cut and paste the data into a new location. To do this press the EDIT menu button and select CUT from the menu. Now use the horizontal scroll bar or the LEFT and RIGHT direction keys to move to the area you wish to paste the data. Tap the stylus in the time-bar at the bar location you wish to paste the data. The location cursor should appear at this location (i.e. a vertical red line is displayed). Now simply press the EDIT menu and select PASTE. You should now see the copied data moved to the new location. You should also notice the location cursor advance past the pasted data ready for you to paste again if required.

There are a few rules governing the way data is copied in track mode which you should be aware of:

1) If you cut or copy data from a single track then you can select a target track and set the location cursor before paste.
2) If you select data from several tracks then you can only set the location cursor. In this instance is not possible to select a target track. Whenever you copy multiple tracks, this data will always be pasted to the track It was copied from.

The Edit Menu

The EDIT menu is available in both track and score editing modes and is accessed by pressing the EDIT key on your Pocket PC.

The EDIT menu contains the standard cut, copy and paste selection tools as well as a number of other features which are described below.

Zoom: This option allows you to zoom in and out of the display. The default zoom level is 3 but you can select higher values to zoom in and lower values to zoom out. This is very useful when you have the Note Length setting at 1/16 and 1/32.

Loop Start: Sets the start of a loop point. You can tell Audio Box to play a certain section of your song in a repeated loop fashion. To do this you need to set a start and end point for your loop and turn on loop mode from the navigation bar.

Loop End: Sets the end of a loop point.

Song Finish: The playback of your song ends when the location cursor reaches the Finish marker. This appears on the timeline as a black square containing the letter 'F'. This option sets the Song Finish point to that of the location cursor. Tap the stylus in the timeline to move the location cursor. You can also click and drag the finish marker to alter the song length.

Track Name: You can specify a text label for each of the 16 tracks which can be used as a reminder as to the contents of each track. You can toggle the printing of track names to screen in the Audio Box preferences screen.

Delete Controllers: Deletes all controllers on the specified selected track. Controllers are an advanced topic covered later in this manual.

Quantize Song: This option should is only necessary after importing midi files because notes are automatically quantised by Audio Box in the score editor. This option automatically fixes problems associated with real time input of midi data such as timing problems. This function moves note on times so that they fall on the nearest beat boundary, specified by the 'Note Length' property. This fixes errors with notes that are slightly out of time. You should select 1/16 or 1/32 note lengths before running the quantise function.

The Score Editor

The score editor is essentially where you lay notes on a specified track. You can manipulate note length and velocity as well as controllers such as pitch bend and aftertouch. You can select the active track from the track menu by tapping the track number in the Information bar. This displays a menu allowing you to select the track. Alternatively you can use the UP and DOWN arrow keys to move between tracks.
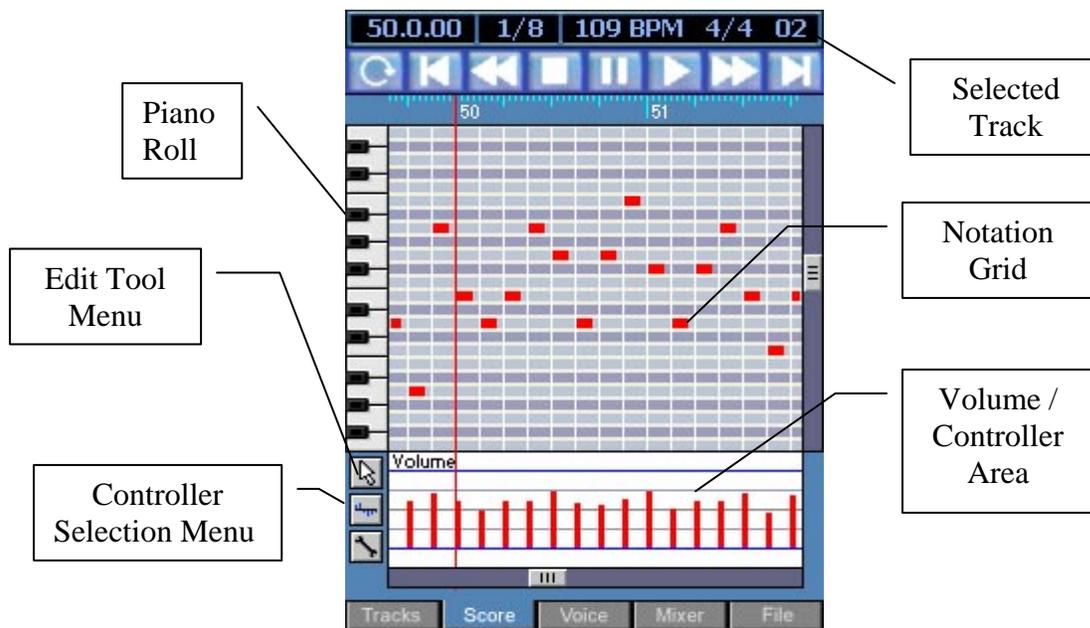

Adding Notes

To add a note onto the notation grid you need to first select the 'Note Length' from the menu (By default this is set to 1/4 bar). Next you need to ensure you have the Pen tool selected from the 'Edit Tools' menu. Now simply tap your pen at the desired location that corresponds to the note on the piano roll using the timeline as a guide.

TIP: If you press the stylus on the screen the note will appear. Keeping the stylus pressed against the screen you can then drag the note to the desired location. Finally lift the stylus to confirm the position.

Moving Notes

To move notes you first need to select the move tool from the 'Edit Tools' menu (The move tool is the arrow pointer icon). Now simply tap on a note and with the

stylus down drag the note to its new location. When you tap a note it becomes selected. You should also notice selected notes appear in blue. You can select as many notes as you like before performing the move operation and can even do so by dragging a rectangle around the group notes.
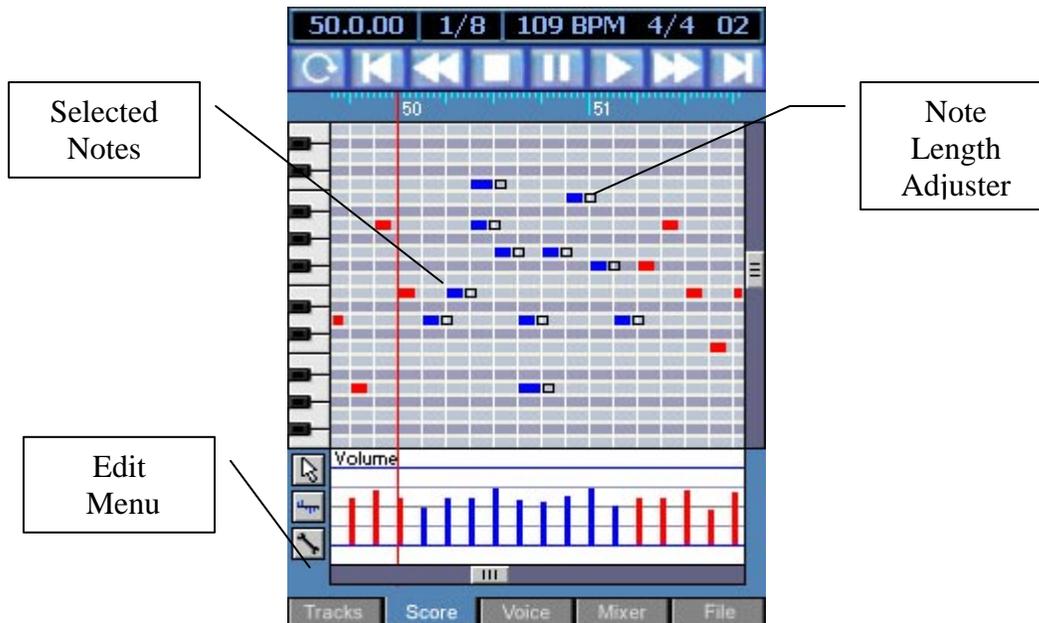
Changing a Notes Duration

You will also notice that selected notes have a square box to the right of the note which are to allow you to change the duration of the note. If you tap this box and drag the to the right you will increase the note duration. If you drag the box to the left you decrease the note duration.

Changing Note Volumes

Once you have added some notes to the score editor you will notice their respective volumes appear at the bottom of the display in the form of vertical bars. The longer the bar length, the louder the volume. To change the volume you first need to select the 'Pen' tool from the 'Edit Tools' menu. Now simply drag your pen over the volume area to raise or lower the volume. Using this method allows you to change the volume of many notes at the same time.

The Piano Roll

At times you may wish to hear a note before you add it to the score. To do this tap the piano roll at the desired note. You should now hear an audible note sound at the requested pitch. The selected note, octave and midi note will also

be displayed on screen in a small window for reference. You must have selected a voice for that track before you can use this function.

Loop Points

Whilst creating your masterpiece it is often helpful to have a few bars of your score loop continuously whilst you add and remove notes or manipulate instrument settings. To set a loop you need to specify start and end points for the loop. You can do this using one of two methods.

If you wish to loop just a couple of bars then the easiest method is to simply click in the timeline and drag from one time to another. Alternatively you can click in the timeline to set the play cursor, press the 'Edit' menu button, then select 'Loop Start'. Simply repeat the process to set the 'Loop End'. Once a loop point has been set you should see the timeline change colour as in the following diagram. Two small arrows appear on the timeline designating the start and end points of the loop. You can select and drag these points to new locations if you wish.
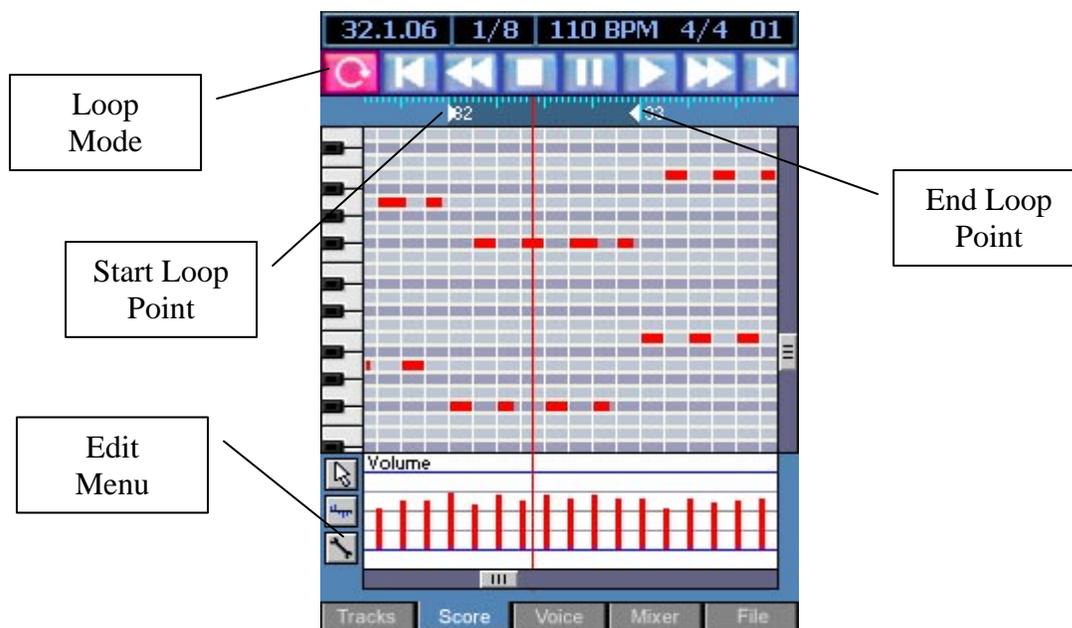
Finally to make Audio Box cycle between your loop markers press the 'Loop Mode' button on the transport bar. Now when you press play, the program will loop between the points specified until you press stop or turn off loop mode.

Voice Selection

In order for any sound to be output you must select an device / instrument for each track you are using. Select the track you wish to assign the instrument from the track editor then press the 'Voice' tab. This displays the following dialog:

You should see a set of sub-tabs appear with 'Device' being the active tab. This screen allows you to choose the device type to assign that channel, in this case channel 01.

Classic Synthesizer: This option assigns a mono/polyphonic synthesizer to the selected channel. You then have complete control over the various synthesizer options using the Page1-4 buttons. This

Pad Synthesizer: Assigns the string pad synthesizer to the selected channel. This is a special additive type synthesis especially for polyphonic sounds like strings, organs, bells and choirs.

Sampler: Assigns a digital sampler to the selected channel. A sampler is an electronic musical instrument that allows you to take existing recordings and sounds and play them back at a range of pitches. You can use the sampler to simply trigger sounds via notes in the score editor (such as drum loop samples) or pitch shift samples to sound like real instruments.

Drum Machine: Assigns the drum machine to the selected channel. A drum machine is a collection of up to 12 drum sounds that can be tuned and assigned to each of the 12 keys of a an octave.

Tip: Once a voice has been assigned to a channel you can play a sample note by pressing the LISTEN key on your Pocket PC.

The Classic Synthesizer

The classic analog synthesizer was developed as far back as the 1920's by Robert Moog, but it wasn't until the 1970's when the first Mini-Moog portable synthesizer became widely available. Since then the synthesizer has become standard issue in most recording studios and are enjoying renewed popularity today. Indeed, analog devices of all types might be more numerous now than they were during their heyday. At the dawn of the 21st century, there is still a steady demand for the technologies of yesteryear.

Most early synthesizers were monophonic and could only play a single note at a time. Only in recent years has this changed, and most modern keyboards are at least 32 note polyphonic and have velocity sensitive keyboards.

These days new forms of digital synthesis such as FM, PWM and Wavetable are used to create more life like sounds, but the original synthesis methods still remain as popular because of their unique synthetic sounds.

A synthesizer works by electronically generating and mixing two or more simple waveforms to create a more complex and pleasing sound.

The Synthesizer module in Audio Box is a very flexible tool, capable of creating all the classic synthesizer sounds, with the added benefit of being polyphonic and velocity sensitive. Audio Box's synthesizers also supports a number of features such as aftertouch and pitch bend that can be controlled via special controller messages sent via the score editor.

Using the Synthesizer

To assign a synthesizer to a track you must first select the track you wish to assign the instrument from the Track editor. Click on the track number to active the required track then tap the Voice tab. A set of sub-tabs appears and the first tab 'Device' should be selected. Now simply select 'Synthesizer' from the list of devices. You have now assigned a synthesizer to the active track.

Patch Selection

Once a synthesizer has been assigned to a track, you can load existing patches or easily make up your own sounds. When Voice is selected from the main tab bar a sub-set of tabs is displayed. The first being the device selection screen (which should be set to Synthesizer). The second tab is where you can load and save patches. A patch is simply a name given to a file which contains the settings that create a sound.

Tip: Once a voice has been assigned to a channel you can play a sample note by pressing the LISTEN key on your Pocket PC.

Now you have loaded a patch you can modify the parameters and customise the sound to your own requirements using the Page 1-4 tabs.

Editing and Creating Patches

When you first assign a synthesizer to a track, the synthesizer inherits default settings, which can be modified and can be saved to create your own patches. It is often easier to load a patch that sounds close to the sound you are looking for then make minor adjustments.

Analogue synthesis is essentially a four stage process, tone generation, tone shaping, volume shaping and finally sound modulation. Each stage generally has it's own set of parameters that work in conjunction with one another. The tabs labelled Page 1-4 allow you to configure various parameters.

VCO
Voltage Controlled Oscillator

At the heart of every synthesizer is the VCO. This is where sound creation begins and is responsible for the overall timber and tuning of the sound. The synthesizer in Audio Box uses two separate sound sources, often referred to as oscillators to generate a sound.

Each oscillator has it's own settings, allowing you to select the wave type as well as the pitch and amplitude of the sound.

There are four different types of waveform you can select, each with it's own unique sound. The sine wave is the most basic of waves and contains no harmonics. The sine wave produces a dull pure tone which is not so audible at low frequencies. The triangle save is similar to the sine wave but has a little brighter sound as a result of the small number of harmonics.

The square wave is made up of an odd number of harmonics and produces hollow sounds.

Saw waves are very rich in harmonics and have a brassy bright sound useful for strings or deep bass like sounds. This is probably one of the most widely used wave types and often produces the most pleasing sounds.
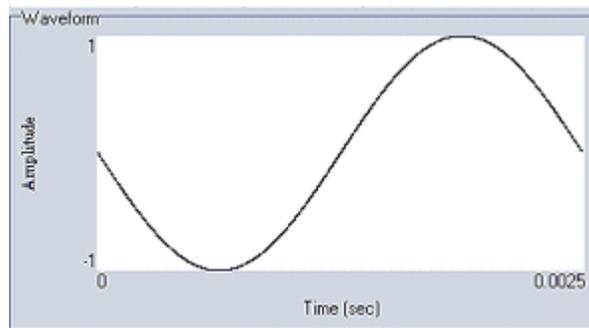
Sine Wave
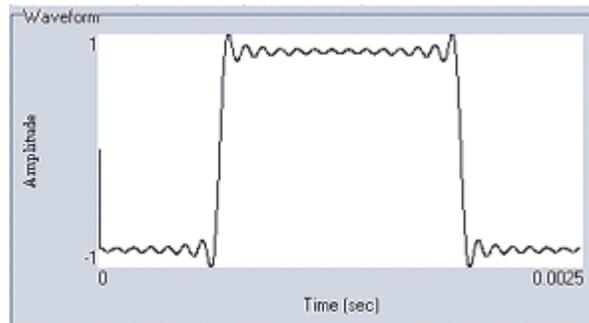
Square Wave

By using a mix of these basic tones you can create many unique sounds. Use the 'Level' option on each oscillator to control the mix of each wave.

There is a third wave generator which we haven't mentioned, and that is the white noise generator. This is a mixture of many different frequencies and is often used to emulate noises such as wind, sea or breath that don't have a fixed pitch. You can control the mix of noise using the 'Noise Level' knob. This sound source is most useful when both oscillators are turned off.

Each oscillator has three tuning knobs which let you set the basic pitch of the output. The note information from the sequencer is added to the basic pitch to create notes.
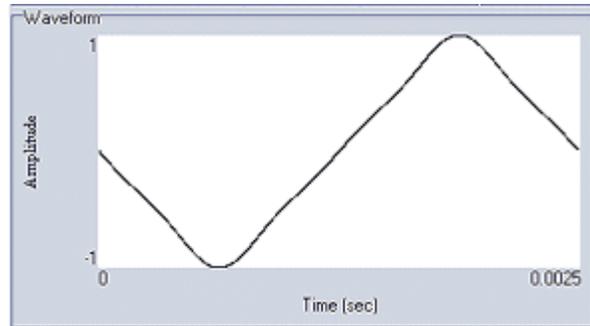
Saw Wave

White Noise

The pitch controls are as follows:

Octave: Allows you to transpose the oscillator up or down by 3 octaves. An octave is the span from say the 'A-440Hz' on a piano to the next 'A' at 880Hz.

Semitone: Allows you to transpose the oscillator by a single note value. You can transpose up and down by a total of 11 semitones.

Detune: Enables you to finely tune the oscillators by a fraction of a semitone. This is useful for detuning oscillators to give a chorus like effect.

Tip: Audio Box is a detune option in the Preferences which allows you to tune the overall output of the program as opposed to a single instrument of oscillator.
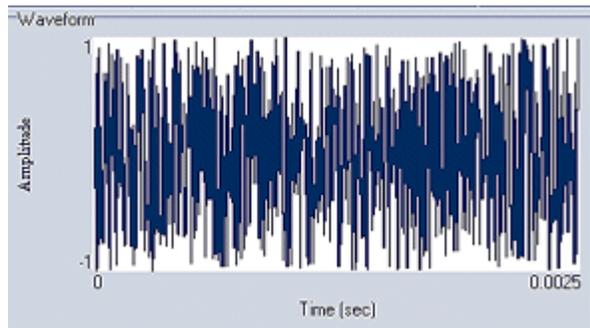
ADSR
Attack, Decay, Sustain, Release

The ADSR settings control the shape of the sound in terms of the way the amplitude or loudness changes over time. These settings allow you to imitate real musical instruments such as the piano that has a sharp attack and a long sustain after releasing the note.

The **ADSR** envelope is specified using the following four parameters:

- **A**ttack: How quickly the sound reaches full volume after the sound is activated (the key is pressed). For most mechanical instruments, this period is virtually instantaneous. However, some for some popular synthesized "voices" that don't mimic real instruments, this parameter is slowed down.
- **D**ecay: How quickly the sound reduces in volume after the initial peak.
- **S**ustain: The "constant" volume that the sound takes after decay until the note is released. Note that this parameter specifies a volume level rather than a time period
- **R**elease: How quickly the sound fades after the end of the note (the key is released). Often, this time is very short. An example where the release is longer might be a percussion instrument like a piano with the sustain pedal pressed.

VCF
Voltage Control Filter

The VCF is a device used to filter out unwanted overtones and leave only the wanted frequencies of the sound.

The 'Cutoff' frequency allows you to alter the tone colours by boosting or cutting harmonics in the signal sent from the VCO.

Changing the 'Resonance' accents frequencies at the cut-off frequency. Be careful not to turn this option up too high as it is possible to create feedback at certain cut-off frequencies.

The VCF also has an envelope which works in a similar way to that of the VCO only here we are modifying the filters cut-off frequency and not the velocity of the notes.

LFO
Low Frequency Oscillator

The LFO is used to add such things as vibrato, tremolo and wah-wah to the final output. At the heart of the LFO is another oscillator, that can be set to a given frequency using the 'Speed' knob. The output of this oscillator can then be fed into the VCO to produce Vibrato, the ADSR to produce tremolo, or the VCF to produce a wah-wah effect.

The low frequency oscillator can have one of 4 wave types, three of which we have seen before. Random is a new type which simply uses contently changing random numbers. This is great in conjunction with the wah-wah for producing wobbly bass like sounds.

The Attack controls how quickly the effect is faded in. If this is set to 0 then the effect will be instantaneous.

FM Modulation

Frequency modulation is a method of creating more interesting forms of sound from the VCO. Enabling this option allows you to modulate the VCO's oscillators using another signal. Altering the Octave and Level allow you to create very aggressive and hard noises.

Keyboard

The keyboard settings allow you to control the way in which notes are manipulated and have nothing to do with the sound production itself.

Portamento: Allows you to glide from one note to another. The higher the setting the slower the glide. A value of 0 turns off this feature.

Bend: Specifies the pitch bend range used by the sequencer..

Tip: The VCF and LFO are very processor intensive and so you can reduce CPU usage by turning these options off.   By default the synthesizer is set to monophonic mode. You can turn off mono mode, but bare in mind this may put a load on the CPU if too many notes are played at once.

The Sampler

The sampler is an instrument which allows you to manipulate previously recorded sounds. You can use the patches provided or use your own using samples you've recorded yourself or downloaded from various sources available on the internet.

Using the Sampler

To assign a sampler to a track you must first select the track you wish to assign the instrument too from the Track Editor. Click on the track number to active the required track then tap the Voice tab.

A set of sub-tabs appears and the first tab 'Device' should be selected. Now simply select 'Sampler' from the list of devices. You have now assigned a sampler to the active track.

The four tabs Page 1 to 4 can now be used to configure the sampler. Most of the settings are similar to that of the Synthesizer except for the first page.

Patch Selection

Once a Sampler has been assigned to a track, you can load existing patches or load your own WAV files to create your own patches. When Voice is selected from the main tab bar a sub-set of tabs is displayed. The first being the device selection screen. (which should be set to Sampler). The second tab is where you can load and save patches. A patch is simply a name given to a file which contains the settings that emulate an instrument. To load a patch tap the stylus on the patch you wish to load and press the load button.

Creating Patches

You can create your own patches by importing external WAV files from your Pocket PC. To do this simply click the Load button and select the sample. Once the sample is loaded it should appear in the sample graph window. You can press the Play button at any time to listen to the sample played at A-440Hz. You should now tune the sample and set any loop points if required.

Tuning Samples

Once a sample has been loaded, you will generally want to tune it. A few exceptions to this are vocals, drum loops and sound effects. Ideally you need to tune the sound so that the LISTEN key produces a note whose frequency is as close to A-440Hz as possible. You can either do this manually using the Octave, Semitone and Detune knobs or let the Auto Tune function do it for you by simply pressing the Auto Tune button. This is not always successful and may fail if you attempt to tune certain sounds like drums, percussion or vocals. The auto-tune function can also fail if there is excessive harmonic content in the sound.

Loop Points

Some of the default Audio Box Sampler patches are very small in size, and yet are able to sustain notes indefinitely. This is done using small samples which are looped to create the impression of being much bigger.

Pressing the 'Loop' button turns on loop mode. Once enabled you will notice two red vertical lines appear on the display, one called the loop start point and the other the loop end point. By default the loop start is placed at the beginning of the sample and the loop end at the end of a sample. When you press the LISTEN button on your Pocket PC the sample will play and loop until you release the button. You can move these loop points by tapping the stylus in the graph area. To move the start point you must ensure the start button is active. Likewise, to move the end point the end button must be active.

When a note on is sent to the sampler, the sample begins playing from the beginning and proceeds until it hits the sample end point. Playback then moves to the start point and proceeds to cycle between the two points whilst the key is down. When the key is released the sample then plays to from it's current location till the end of the sample.

Setting loop points can be very frustrating and time consuming. Not all samples can be perfectly looped, and in many cases you may need a little help from the loop point locators. The 'Previous' and 'Next' loop point buttons will attempt to search for ideal loop point locations, matching velocity and phase of both loop points. You will need to select the 'Start' and 'End' buttons accordingly so that the 'Next' and 'Previous' locator functions know which loop point you are moving.

The Pad Synthesizer

The Pad synthesizer is specially designed for creating strings ensamples, choirs, organs as well as bell and metallic type sounds. You should use this in preference to the classic synthesizer whenever possible if a track contains polyphonic data (i.e. plays multiple notes at the same time).

The Pad synthesizer is capable of producing some really beautiful sounds which are just not possible with the classic analog synthesizer. It uses a technology called additive synthesis by which sounds are created by layering harmonics.

Using the Pad Synthesizer

To assign a pad synthesizer to a track you must first select the track you wish to assign the instrument too from the Track Editor. Click on the track number to active the required track then tap the Voice tab.

A set of sub-tabs appears and the first tab 'Device' should be selected. Now simply select 'Pad Synthesizer' from the list of devices. You have now assigned a pad synthesizer to the active track.

The four tabs Page 1 to 4 can now be used to configure the pad synthesizer. Most of the settings are similar to that of the classic synthesizer except for the first page.

Creating sounds with this instrument is rather like painting by numbers. You don't really need to understand how it works, although I will try and give a brief explain.

All natural real world instruments produce sounds which are not so simple as those produced using the classic synthesizer. When you play A4 (440Hz) on a piano keyboard and analyse the sound produced, you will see that the fundamental frequency is 440Hz, but there are many overtones or harmonics that occur at 880Hz, 1760Hz and so on. The classic synthesizer cannot emulate these overtones which is why the sounds it creates are so synthetic.

The Pad Synthesizer has 32 drawbars which correspond to 32 overtones or harmonics that can be added or subtracted from the fundamental frequency. The first drawbar is set by default as this is the root frequency of the note. You will notice the graphical display shows that of a sine wave. As you click on the various drawbars to add and subtract harmonics you will see this sine wave

change. You will notice that there is a brief pause whilst Audio Box computers the sound. Once this process is complete you can hear your sound by pressing the LISTEN button on your Pocket PC.

Once you have the tonal quality you desire you can 'beef it up' by increasing the 'Bandwidth' knob. This fattens out each of the harmonics as illustrated in the diagram below. Notice how the high end harmonics have merged together. This is a due to the frequency spectrum being non linear and will result in making the sound appear mushy, which is great for strings ensembles, but not so good for other sounds.

The 'Scale' knob is used to control the bandwidth at high frequencies by compensating for the non linear frequency scale. A value of 0 ensures all harmonics have the same bandwidth, whilst a value of 1 gives the largest frequency spread.

Frequency Spread of a single harmonic

Frequency Component of sample and it's harmonics
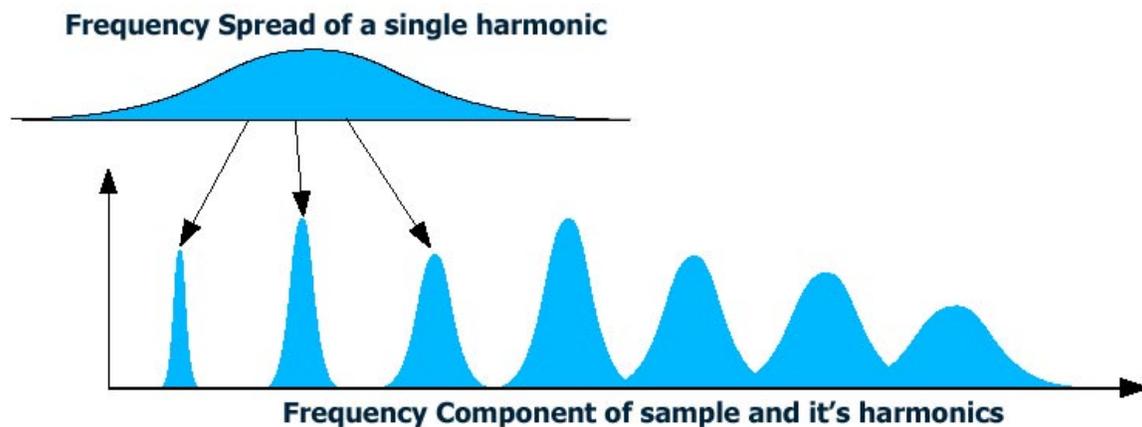
Pressing the 'Reset' button removes all but the fundamental frequency allowing you to start over again from a pure sine wave.

Pressing the 'Detune' button causes the harmonics to drift slightly creating discordant metallic or bell like sounds.

By default the pad synthesizer is set to polyphonic mode and should always be used in place of the classic synthesizer where possible as it is less CPU intensive.

That's all there is to it….

NOTE: Please see the classic synthesizer section for information on configuration pages 2-4.

Drum Machine

The drum machine allows you to create your own drum kits using standard WAV files. You can have up to 12 samples in a drum kit, all of which can be independently tuned and normalised.

To assign a drum machine to a track you must first select the required track you wish to assign the instrument to from the Track Editor. Click on the track number to active the required track then tap the Voice tab.

A set of sub-tabs appears and the first tab 'Device' should be selected. Now simply select 'Drum Machine' from the list of devices. You have now assigned a drum machine to the active track.

Tabs 'Page 1' and 'Page 2' can now be used to configure the drum machine and tune your samples.
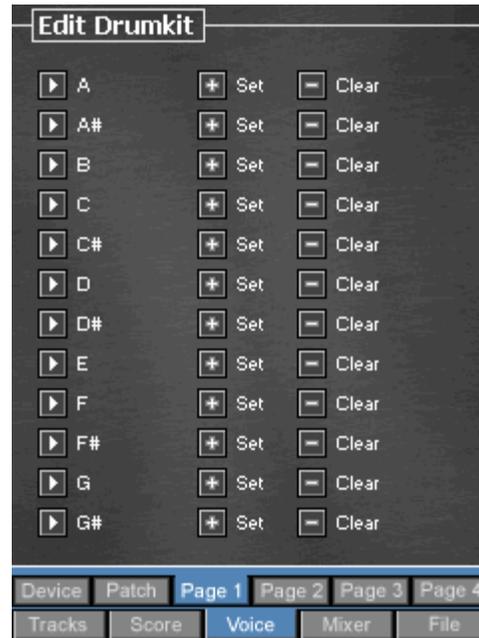
Audio Box does not have a specific drum pattern editor as such, instead you lay notes in score view just as you would with any other instrument. All 12 notes of an octave can be assigned a unique drum sound. If you assign a snare drum to 'A#' you will hear a snare drum when playing A# regardless of the octave.

> **Tip:** You can tap the keys on the piano roll in the score editor if you need a reminder of which drums sounds are assigned to which keys.

By default the gm.drumkit will be loaded. Pressing any of the keys labelled A to G# will play one of the 12 drum sounds.

Assigning Samples to Keys

To assign a new drum sound to a key simply press the 'Set' button which corresponds to the note you wish to re-assign. A standard browse dialog will now appear allowing you to select a WAV file. You can remove a sample by pressing the Clear button. This will reduce the size of the saved song if you have chosen to write out instrument patches.

Tuning Your Drum Kit

When creating a new drum kit you may find that some samples may appear louder or even out of tune when compared to others. You can fix this problem using the Pitch and Volume settings on Page 2 of the instrument settings.
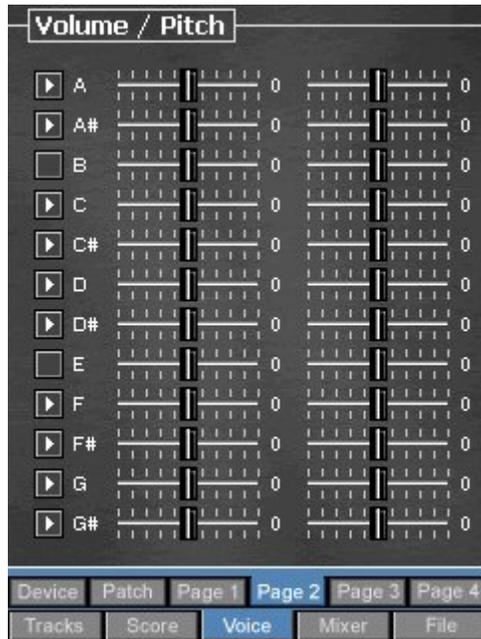
This screen shows the 12 notes which have samples loaded. Notice that B and E don't have the little triangle! This is because these notes do not have a sample assigned to them.

By altering the left slider you can cut or boost the volume of the sound.

By altering the right slider you can increase or decrease the pitch of the sample by one semitone. You can transpose the sound by as much as an octave in either direction.

Pressing the buttons A-G# will allow you to listen to your changes.

Suggested Drum Layout

Although you are free to allocate any drum sounds to any note the following layout is recommended, especially if you are importing midi files.

C   Bass Drum
C#   Symbols
D   Snare / High Tom
D#   Ride Cymbal / Hand Clap
E   Electric Snare
F   Low Floor Tom
F#   Closed Hi Hat / Tambourine
G   Splash Cymbal / Floor Tom
G#   Rim Shot / Cowbell
A   Lo Tom
A#   Open Hi Hat
B   Acoustic Bass Drum

The Mixing Desk

Audio Box is equipped with a 16 channel mixing desk which allows you to adjust the overall mix of the sound and add various effects to instruments. If you select the Mixer tab you will notice that a set of sub-tabs appear allowing you three options, current track, effects and all tracks.

The 'Current Track' tab shows the mixer settings for the active track.

This screen is where you adjust the volume and pan settings as well as being able to add effects.

The 'Mute' button when pressed stops output from this channel. This is useful when you want to listen to your mix without this track.

The 'Solo' button when pressed mutes all other tracks so you can listen to the selected track in isolation. This is very useful for setting up effects and instrument settings.

The 'Dry' button simply bypasses the effects assigned to that channel.

Assigning Effects

You can have up to 3 effects per channel although care should be taken not to assign too many. The number of effects used in your song is restricted only by the speed of your Pocket PC, but they are very processor intensive and so it is advisable to keep these to a minimum.

To assign an effect simply click the 'Set' button. A popup menu will appear with a list of available effects. Select the effect you wish to assign and you should see the 'Enable' button activate and the effect name appear under the 'Effect Level' knob.

Use the 'Effect Level' knob to adjust the amount of effect applied to the selected track. To clear an effect, press the 'Clear' button.

Pressing the 'Enable' button will temporarily disable the effect.

Pressing the 'Effects' tab allows you to modify the effect parameters assigned to the active track.

Some effects are more processor intensive than others so bare this in mind. If you need to use lots of effects and the sound starts to break up then you need to consider removing effects or lowering the audio output from 44Khz to 22Khz. This should allow you to get a reasonable quality output whilst having more effects active.

Pressing the 'All Tracks' tab displays the multi channel mixing console. This is a more conventional style mixer allowing you to visually monitor and adjust all tracks from a single screen. Only six channels are visible at any one time so you need to use the horizontal scroll bar to see channels 7-16. There is also a 'Master' volume which allows you to adjust the final output to avoid clipping.


Each mixer channel has it's own volume and pan controls.

You should ensure the LED's do not peek in the red as this means the signal is being clipped and is likely to result in audible clicks or distortion.

Care should be taken to ensure the overall mix doesn't cause excessive peaking of the VU meters. In general it is best to have the needle occasionally peaking into the red zone. If the needle is constantly in the red then the audio signal will be clipped and distortion or clicking will occur.

Loading and Saving Songs

Once you have completed your masterpiece you will want to save your work. You do this by pressing the 'File' tab and then selecting the 'Save Song' sub-tab.
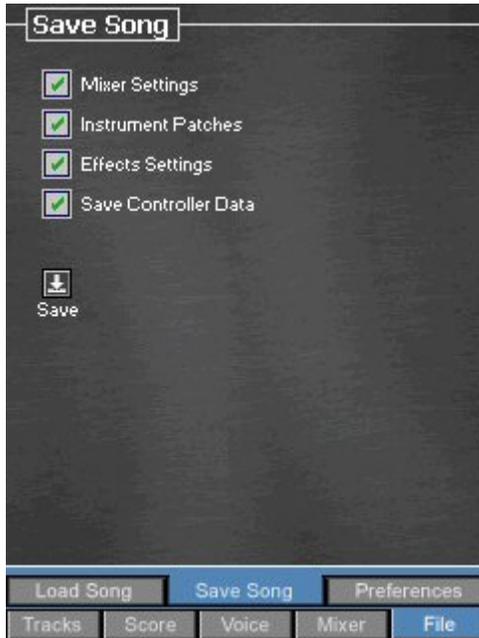
When you save a song you can save various settings and instruments as well as the musical score. This means that the saved song is almost like a package that contains everything needed to recreate your song and can be passed on to other Audio Box users.

The save options are as follows:

Mixer Settings: If this option is checked then all settings such as track volume and pan for each channel are saved.

Instrument Patches: This option saves all instrument settings and the samples used to create the sounds. This includes all drum machine and sampler sampled sounds.

Effect Settings: Check this option to save effects you have assigned to various tracks and their settings.

Save Controller Data: Allows controller data to be saved along with the score. This includes things such as pitch bend, aftertouch, automated mixer settings, and real-time instrument messages.

Save: Actually saves the song. Pressing this button prompts you to name your song. Once the song is saved you will return to this screen.

To load a previously saved song press the 'File' tab, then the 'Load Song' sub-tab. A list of songs will appear from which to select. Tap the stylus on the file you wish to load and press the 'Load' button. Once loaded you will be taken to Track view ready to play the song.

There are also a number of other buttons in this screen which have the following functionality.

Delete: Deletes the selected song. On selecting this option you will be prompted if you wish to delete the highlighted song. Press 'Yes' to delete the file or 'No' to abort.

New: Allows you to create a new song by deleting the currently loaded score, instruments, mixer settings and effects.

Import: Allows you to import a midi file. Midi files are a standard file format used for storing musical scores and instrument control data.

Importing Midi Files

Audio Box allows you to import scores from other musical packages by means of a midi file import function. You can do this via the 'Import' button in the 'Load Song' file area. Midi files only contain score data, and not instrument sounds or settings.

NOTE: Midi files are created with the intention of being played on midi compatible devices that have a GM (general midi) compatible sound cards or software synthesizers. Your Pocket PC is not equipped with the ability to play standard midi files as standard, nor does it have a MIDI compatible sound card. Therefore scores imported in this way will not sound as the creator intended, and some work is needed to configure the instruments after import.

Pressing the 'Import' button displays a popup menu asking if you wish to 'Import MIDI by channel' or 'Import MIDI by Track'. Once one of these options is selected you will be prompted for a file to import.

'Importing by channel' is the likely choice as this ensures best compatibility with Audio Box. This is due to the fact that the midi standard has a total of 16 midi channels, which maps nicely to Audio Box's 16 channel mixer.

'Importing by track' allows you to retain the track layout and track names but will be problematic if the file contains more than 16 tracks. Anything above track 16 is discarded.

After loading a midi file Audio Box automatically allocates instruments to each of the 16 channels. By default a classic synthesizer with default settings is assigned to all channels except channel 10, which is assigned the drum machine. This is because the midi standard usually maps channel 10 as drums. This makes perfect sense when importing by channel, but may need to be changed if importing by track.

By default each synthesizer is set up in monophonic mode. You can change this if a track contains requires polyphony, but it is not recommended to do this for every channel. It is more CPU friendly to keep the synthesizers in monophonic mode if possible. If this causes problems then you may need to consider changing the audio output to 22Khz. Alternatively select a Pad Synthesizer instead of the Classic Synthesizer as it is better suited for the job.

Preferences

The Preferences are accessed via the 'File' tab and contains various program settings that can affect the way Audio Box performs. You can also check this screen to see if your CPU is under stress or if you feel you are running low on memory.

By default Audio Box is set to output high quality 44Khz stereo audio. This is fine for most users providing your Pocket PC is fast enough to keep up with your demands.

If you wish to use lots of effects or your song is very hungry in terms of polyphony you may need to change this to 22Khz. This will reduce the quality of output, but gives you twice the processing power.

To change the sample rate you need to select the desired settings, 44Khz, 22Khz, Stereo etc. then press the 'Apply Changes' button. Please note that this will delete all song data in memory so please ensure you save your song before doing this.

Bypass Effects: This option turns off all the effects assigned to each of the 16 tracks. If a song is too processor intensive with effects it is handy to be able to turn them off.

HQ Mode: This option is used to turn on high quality rendering of the sound by anti-aliasing the audio output of the synthesizers and sampler. Turning this option off should reduce the CPU load.

Display Track Names: This option turns on and off the track names assigned in the track editor. The screen can become a little littered at times, so it's nice to clean up the display by turning this feature off.

Master Volume: This allows you to control the Pocket PC's volume control without leaving Audio Box.

Master Tune: It may be useful to tune the output of Audio Box to other instruments. The master tune option allows you to fine tune the output by +/- one semitone.

Metronome Volume: This controls the volume of the metronome. The metronome can be turned on or off from the OPTIONS button.

Most of these preferences settings are saved between sessions.

Tip: If the CPU meter is constantly peeking at 100% then you may want to consider changing to 22Khz mode or turning off HQ mode to reduce the load.

Controller Messages

Audio Box allows you to control various program settings in real-time as a song is playing. You can automate the mixing desk or adjust a synthesizer's cut-off filter on the fly if you wish. You do this using controller messages.

Pressing the 'Controller Menu' button displays a list of devices that you can control. This consists of the Instrument attached to the selected channel, the Mixer settings for the channel, and the settings for selected effects 1-3.
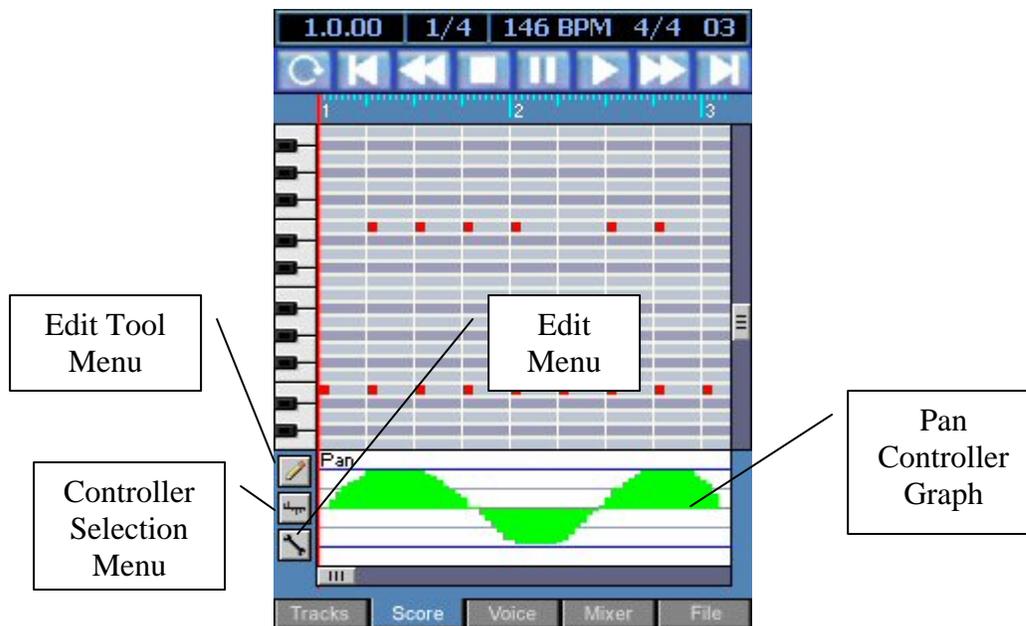
Controller
Menu
Button
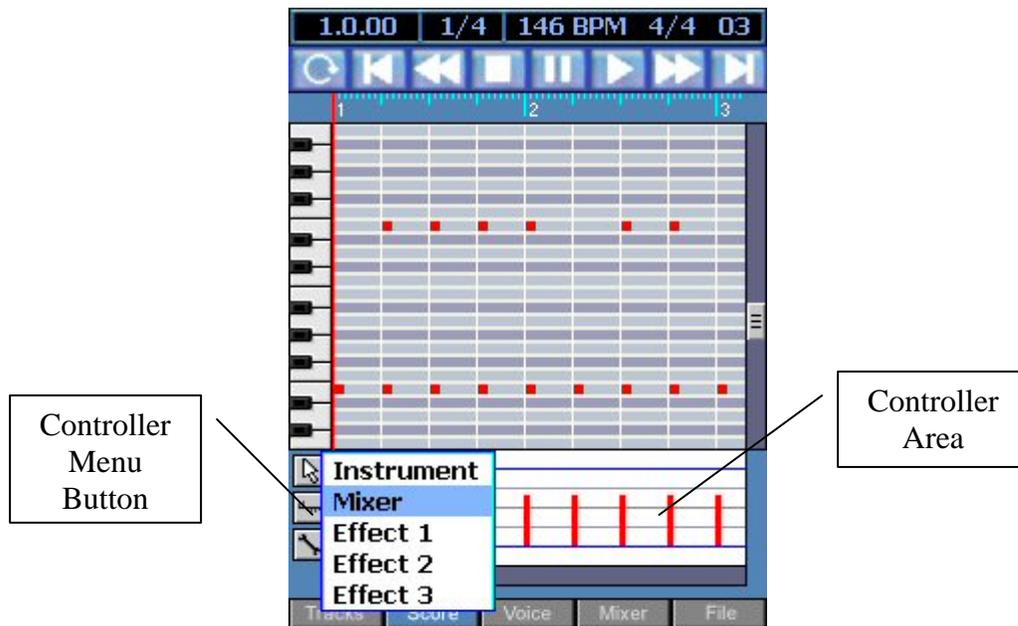
Controller
Area

Selecting a device from the popup menu will then display a sub-menu of the parameters that can be automated. Select the desired controller and the controller area title will change accordingly.

You now need to select the pencil tool from the 'Edit Tools' menu in order to draw controllers Once selected you can draw into the controller area window using this tool. The following diagram shows the mixer pan controller messages of channel 3.

NOTE: Some controller messages like pan and pitch bend use the centre of the controller window as a reference whilst others use the base of the window.

Selecting the 'Eraser' tool from the 'Edit Tools' menu allows you to remove controllers from the graph area. With the eraser selected simply draw over the area of the controller graph you wish to remove.

Edit Tool Menu

Edit Menu

Controller Selection Menu

Pan Controller Graph

Deleting All Controllers

At times you may wish to remove all controller massages from a track. This can be done quickly and easily by selecting the 'Delete Controllers' message from the 'Edit' menu.

Instrument Controllers

The following list of parameters can be automated with both synthesizer and samplers:-

VCO: Volume, Aftertouch, Pitch Bend, Portamento
VCF: Resonance and Cut-off Frequency
LFO: Vibrato, Tremolo and Wah-Wah

Please Note: The LFO options only take effect if LFO is turned on for the selected instrument. Likewise, the VCF options are also only effective when the VCF is enabled.

Cut, Copy and Pasting Controllers

It is possible to copy and move blocks of controllers using cut, copy and paste. To do this you must have first selected the 'Move' tool from the 'Edit Tools' menu.

To copy a block simply drag your stylus over the area you wish to copy then press the EDIT button and pick 'Copy' from the menu. Now place the location cursor you wish to place the copied data then select 'Paste'.

To move a clock simply repeat the process using Cut and Paste.

Audio Effects

Audio Box allows you to add various effects to each of the 16 mixer channels. There are 7 different effects available for you to choose from, which are described below.

1) **Digital Delay:** This effect is pretty self explanatory, and simply adds a delay or echo to the channel it is assigned to. Use this in preference to the reverb where possible as it is less of a load on the CPU.

2) **Digital Reverb:** Adds reverberation to the selected channel. The reverb is a very fast form of delay which emulates the sound of large theatre halls or cathedrals. This effect is quite processor intensive.

3) **Chorus:** Enhances a sound to give the impression of there being more than one sound source. This thickens up the sound giving an ensemble type effect.

4) **Phaser:** This effect creates a rich sweep type effect by modifying the phase of the selected audio channel. This effect is very processor intensive and so should be used sparingly.

5) **Distortion:** Creates a simple distortion effect, useful for guitar sounds or creating lo-fi effects on vocals and drums.

6) **HP/LP Filter:** This is a digital filter which is capable of removing certain frequencies above or below a specified cut-off frequency. This is similar to the cut-off frequency setting of the classic synthesizer, but has the added advantage of being able to be used on drum kits.

7) **Gapper:** Used to create sounds associated with the trance genre of music. It works by cutting chunks out the sound giving the impression of playing fast sequences of notes in time with the tempo of the song. If the speed setting is set to 4 you can select one of 4 pattern buttons to allow more interesting effects. Please note that this effect can only be heard whilst playing your composition as it syncs the gaps with the music using signals sent from the score editor when playback has started. You could set up a simple one bar loop to test this effect.

Some audio effects can be controlled using controller messages sent from the score editor. The following effects are available for automation:-

Effect	Automation Features
Digital Delay	Decay Feedback
Digital Reverb	Brightness
HP / LP Filter	Resonance Cut-Off Frequency
Phaser	Feedback Depth
Gapper	Speed Delay
Chorus	Speed Width Depth

For more information on automation of effects see the section of the manual concerning controller messages.

Note: Adding too many audio effects will seriously overload the CPU and cause stuttering and break-up of sound. If you really need to use more than a couple of effects then you should consider switching to 22Khz mode.

Quick Start Guide

This section gives a basic outline of song construction and briefly looks at various elements of the user interface. Once you've read this section you should be confident enough to start constructing your own songs.
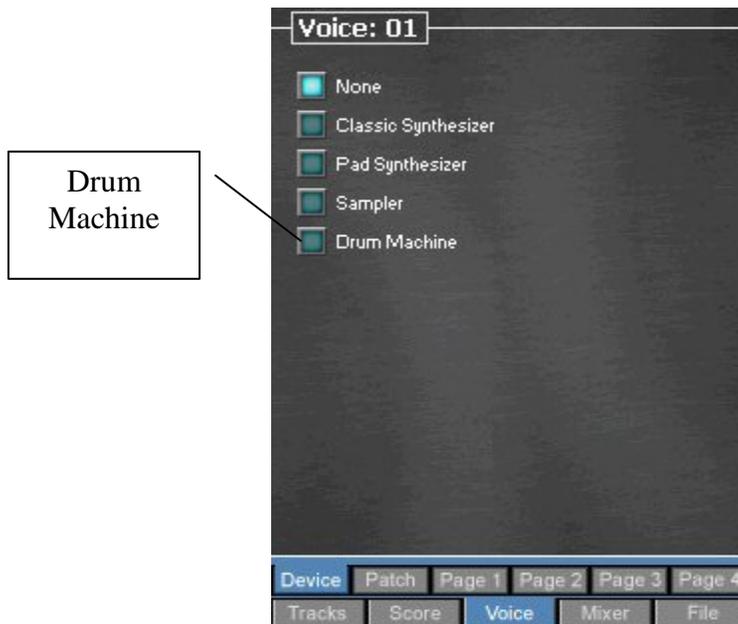
Laying down a basic drum pattern:

When Audio Box is launched you will be presented with the track editor screen. The track editor gives an overview of your whole song and allows you to copy and move chunks of your song from one location to another. The following steps show how to assign an instrument to a track and begin composing using the score editor.
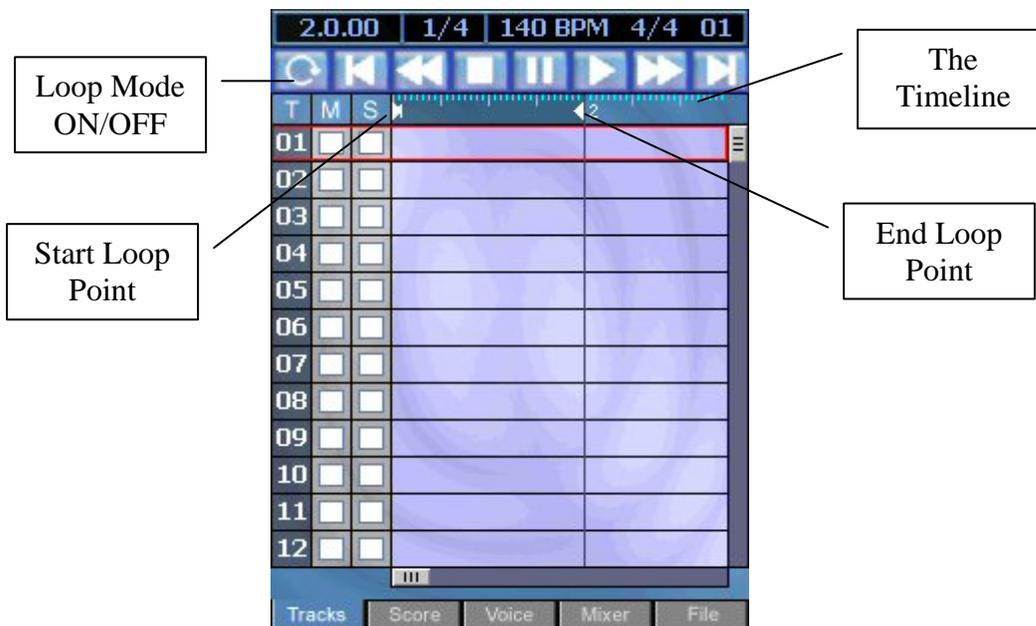
1) The first thing you need to do is select the track you wish to work with. The active track is the one with the RED bounding rectangle. You can change the active track by clicking on the track number or by using the UP and DOWN cursor keys. The diagram below shows the empty track editor. Track one has the RED rectangle and is therefore the active track. Notice the active track number is displayed in the top right of the information bar.
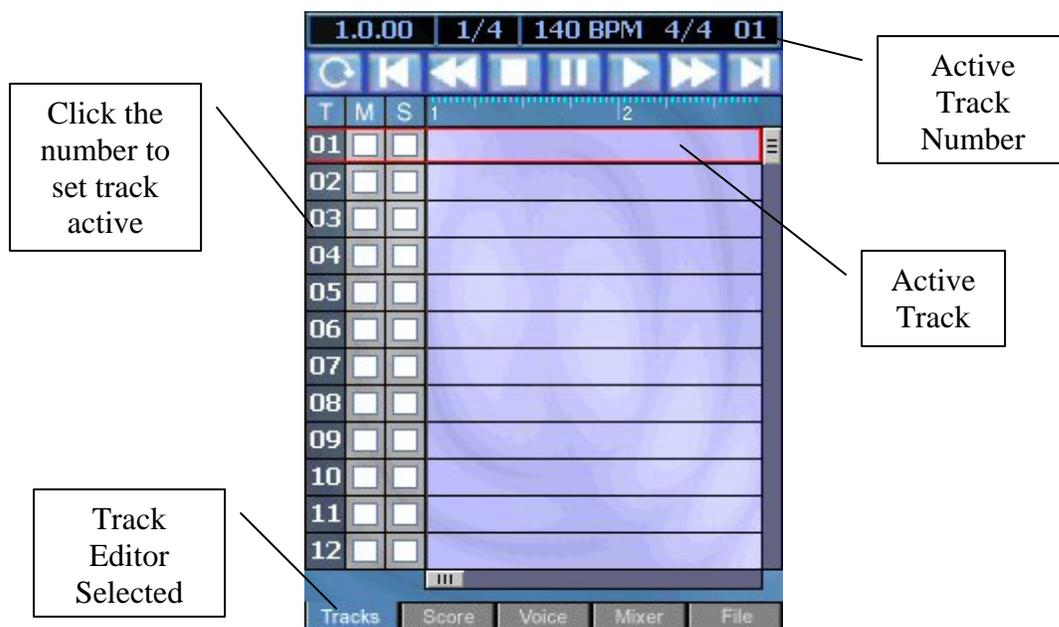
2) The Voice, Mixer and Score tabs always display information about the active track. Click on the 'Voice' tab at the bottom of the screen to assign an instrument to the active track. The following instrument selection screen is displayed from which you should select the drum machine.

Voice: 01

- None
- Classic Synthesizer
- Pad Synthesizer
- Sampler
- Drum Machine

Drum Machine

Device | Patch | Page 1 | Page 2 | Page 3 | Page 4
Tracks | Score | Voice | Mixer | File

3) Now press the Track tab to return back to the track editor. We are now going to turn on loop mode and set loop points which will be used to cycle between a bar of our song whilst we add notes to our score.

2.0.00 | 1/4 | 140 BPM | 4/4 | 01

Loop Mode ON/OFF

The Timeline

Start Loop Point

End Loop Point

Tracks | Score | Voice | Mixer | File

Press the 'Loop' button on the left of the navigation bar. Once active it should turn red. Now tap and hold the stylus on bar one of the timeline and whilst the stylus is in contact with the screen drag it to bar two. When you release the stylus you should see a grey area appear in the timeline with two inward facing arrows. This indicates that a loop is set between the two arrows.

4) Now press the 'Play' button on the navigation bar and ensure that the location cursor cycles between the two loop points. When the cursor hits bar two it should begin again at bar one. If all goes well then you are ready to start adding notes.

5) At this point you may wish to turn on the metronome. To do this press the OPTIONS button and select the 'Metronome' option. You can always turn this feature of later if you find it undesirable. You can alter the metronome volume from the Preferences window located in the 'File' tab area. When enabled the metronome plays a soft sound every beat and a slightly louder sound every bar. This can be used to judge the tempo whilst editing your song.

6) Click on the 'Score' tab at the bottom of the screen to switch to the score editor mode. This is where you enter note data for the active track. Taping the stylus on the piano roll allows you to hear the pitch of a note or in this case drum sound laid at that vertical position on the notation grid.
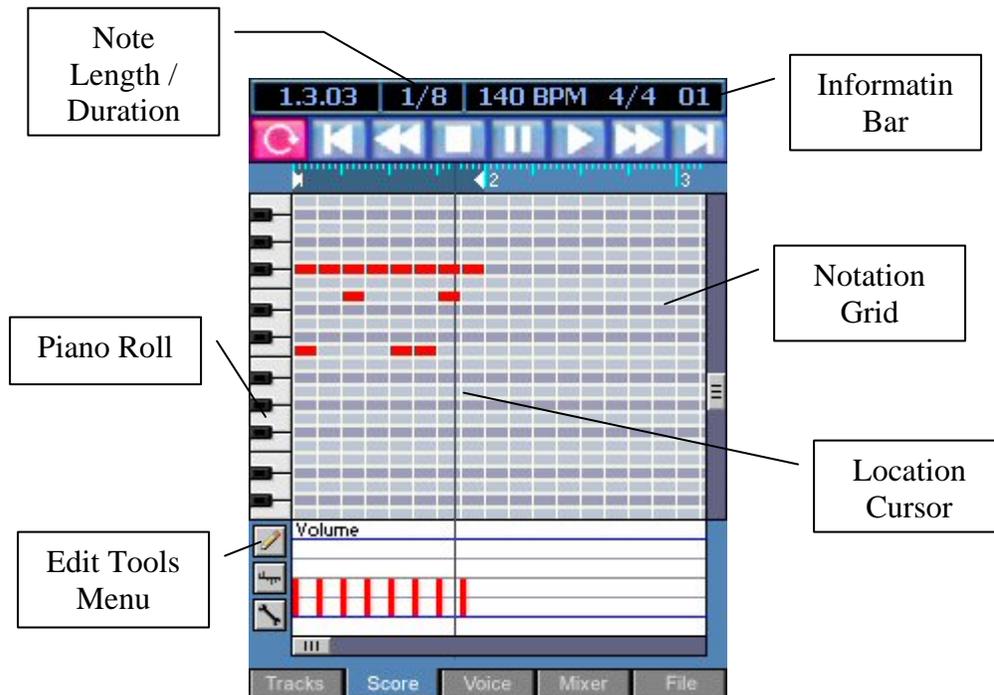
7) Next we need to set the length of the notes we wish to lay on the notation grid. Click on the 'Note Length / Duration' option in the information bar. A menu will appear containing a list of fractional bar values. Select 1/8 from this list.

8) Select the 'Pen' tool from the 'Edit menu' button.

9) Finally tap the stylus on the screen to lay notes as in the above diagram. As you lay the notes you will hear them play as the location cursor cycles around the track. If you make a mistake don't worry. You can move notes by simply selecting

the 'Arrow' tool from the 'Edit Tools' menu and drag the note to the required location. You can also remove notes using the 'Eraser' tool.

NOTE: If you wish you can change the volume of any particular note by selecting the 'Pen' tool and drawing in the controller area beneath the notation grid. Each vertical bar represents a notes volume and the length of the bar represents it's respective volume. The longer the length of the bar, the louder the note.

If all has gone well you have now successfully laid your first bar of drums.

Adding a Bass line:

1) Change the active track to '2' using the UP and DOWN arrow keys (or using the method described earlier in track mode)

2) Press the 'Voice' tab and assign a 'Classic Synthesizer' to that track from the 'Device' selection on the first sub-tab.

3) Switch back to score mode and add the following bass line.
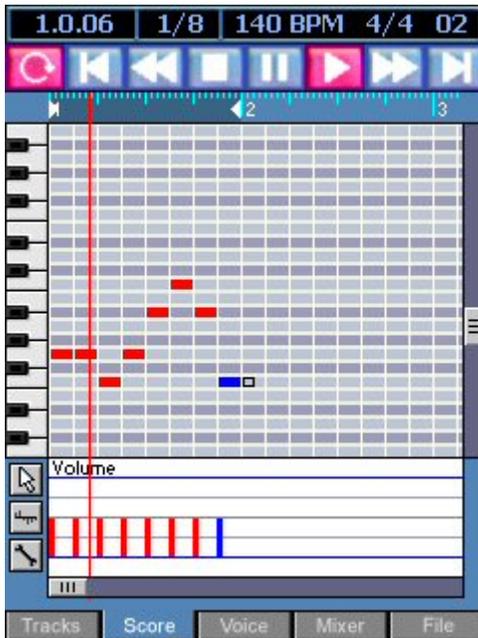
This is just an example of how you can layer up your song, creating it one bar at a time. We could have set the loop points to span several bars, or chosen not to use loop points at all.

You can customise the instruments or change the way they sound by clicking the 'Voice' tab. A set of sub-tabs will appear allowing you to change the parameters of the selected instrument. The Patch tab allows you to load some of the ready to use instrument patches, whilst Page 1-4 allow you to manually tweak the various instruments.

Once you have several tracks of data you may wish to change their respective volumes. You can do this using the mixing desk, available on the 'Mixer' tab. The Mixer allows you to set the volume, pan and effects for each track.

Troubleshooting

This section is intended to help those who are having problems with Audio Box and is in the form of questions and answers. If you cannot find the answers here please contact us via our website.

Question	Answer
I have entered some data in the score editor but I cannot hear any output when I press play. Why is this?	1) You have not selected an instrument for that track. 2) The mixer setting for that track is set too low. 3) The Pocket PC's volume control is turned down or muted.
Why is the sound is distorted during the playback of my song?	1) Try reducing the volume of all the tracks in the mixer, or lower the master mix slider. 2) Reduce the level settings of the instrument causing the problem.
Why is the sound breaking up and the screen update slowing to a crawl?	1) You are playing a song which is playing back lots of notes at the same time. You need to reduce CPU load by doing one of the following: a) Disable the VCF and LFO on instruments where possible. b) Switch HQ mode off in Preferences. c) Switch to 22Khz mode. d) Reduce the number of effects or turn bypass effects on in Preferences. e) Use the pad synthesizer and sampler instead of the classic synthesizer where possible.
Why does the samplers 'Auto Tune' not work on certain samples?	This feature does not work well for certain types of sounds such as vocals, sound effects and drums etc. Also some sounds rich in harmonics make it difficult to detect the fundamental frequency. In this case you must resort to manual tuning.
How do I adjust the song length?	Select the 'Song Finish' option from the EDIT menu.
Why is the Gapper effect not working?	This effect only works when a score is being played. It synchronizes itself with

	the sequencer so it must be running to hear the effect.
Why do MIDI files not play correctly?	MIDI files are designed to work on equipment that have a general midi compliant sound card. The Pocket PC doesn't have such a device. Audio Box imports only note on and off information as well as volumes, pitch bend and tempo. It is your responsibility to assign the correct instruments to watch track after an import.