AXON

AX 50 USB

AXON AX 50 USB

English Manual

Version 2.0 | January 2008

CE Declaration

We:

TerraTec Electronic GmbH, Herrenpfad 38, D-41334 Nettetal, Germany

hereby declare that the product:

AXON AX 50 USB,

to which this declaration refers is in compliance with the following standards or standardising documents:

1. EN 55022

2. EN 55024

The following are the stipulated operating and environmental conditions for said compliance:

residential, business and commercial environments and small-company environments.

This declaration is based on:

Test report(s) of the EMC testing laboratory

Contents

Preface

Thank you for choosing a TerraTec AXON Technologies product for your musical endeavours. With the AXON AX 50 USB, you've purchased a sophisticated product representing the state of the art of studio technology – and we're convinced this innovative development will prove extremely useful to you in the coming years and, above all, provide you with a great deal of entertainment.

We hope that this brochure is helpful to you while using the product. It is designed to illustrate technical relationships based on practical examples from the studio environment. This brochure is not only designed to help beginners with this complicated subject - advanced professionals will also find the occasional bit of useful information.

Sincerely,
Your AXON Technologies Team

Scope of delivery

Start by making sure that the contents of the package are complete.

The AXON AX 50 USB package should contain the following items:

■ 1 AXON AX 50 USB

■ 1 USB cable

■ 1 power adapter 12VAC / 1.5A

■ 1 Quick Start manual

■ 1 AXON AX 50 USB product CD (with detailed manual)

■ 1 WAVE XTABLE VI DVD

■ 1 service request form

■ 1 registration card with the serial number

Please fill out and return the registration card enclosed in the package to us at your earliest convenience or register online at **www.terratec.net/register.htm**. This is important for support and hotline services.

Optional accessories

The following products are available separately from TerraTec AXON Technologies:

■ PU 100 pickup for guitars with steel strings (available from spring 2008)

■ AIX 103 pickup for 4, 5 and 6-string bass guitars with steel strings

■ AXK 100 13-pin cable, 5m, to connect the pickup to the AXON AX 50 USB

Congratulations…

…on your purchase of an AXON AX 50 USB, the second guitar-to-midi converter by AXON Technologies. The AX 50 USB is based on the same technology as the AX 100 MKII, the probably most powerful device of this type, but it has additional options, such as a USB port and four MIDI ports, which makes it ideal for state-of-the-art, computer-based studios.

Thanks to the neural network used in the development of its algorithms, the AXON AX 50 USB is able to determine the precise pitch of a note the instant it is picked, whereas other devices require several oscillations of the string for analysis. The early recognition of transients lets the AXON simultaneously determine pitch, amplitude, and even the location at which the string was picked – an unparalleled ability to date. This is due to the AXON's unusual splitting options. For example, you can use a string split to divide the strings of your guitar into two zones, each with its own sound properties. Or use a fret split to divide the fingerboard of your guitar into two separate playing zones. Pick splits let you divide the picking area of the guitar into up to three independent sound zones that you can select instantly by changing your picking position. You can achieve impressive effects with the pick control function, which lets you control modulation effects and others with your picking position. Splits and effects can be combined, stored in up to 128 complex presets and recalled as needed. Another unique feature of the AXON AX 50 USB is its unrestricted support for both acoustic guitars and basses with hex piezo pickups. This opens the MIDI world to bass players and classical guitarists that are looking for new, contemporary forms of expression.

Safety information

Please ensure that analog devices are turned off before plugging them in. This will protect you from any possible – albeit weak – electrical shocks, as well as protecting your speakers and your hearing from sudden peaks.

QuickStart guide

for those of you who can't wait:

- To configure the many settings of the AXON AX 50 USB, please install the editor software on your computer and connect the AXON AX 50 USB to your computer using the included USB cable. A separate driver installation is not required.

- If you would like to use the included WAVE XTABLE VI contact player with its 128 sounds for audio output, please install it from the included DVD.

- If you are using an external MIDI instrument for audio output, connect the MIDI OUT of the AXON to the MIDI IN of the instrument.

- Connect your guitar to the AXON AX 50 USB. Your guitar must be equipped with one of the included hexaphonic pickups such as the AXON PU 100 or 103, or a piezo pickup such as those offered by GraphTech, RMC or other vendors. Please use the 13-pin AXK 100 cable. The socket at the left of the front panel labelled "INPUT" is the one you need. Ensure that the plug clicks into place in the socket for optimal contact.

- Finished! The AXON has been preconfigured at the factory to let you get started with a minimum of hassle.

- We nevertheless recommend that you take the time to set up the AXON to suit your playing style and your instrument. It's essential if you want to fully leverage the AXON's strengths and experience the best possible tracking.

Connectors and controls

Front panel

1. Socket for the special 13-pin AXON AXK 100 cable (not included) to connect guitars/basses with hexaphonic pickup systems (e.g. AXON PU 100 or AXON AIX 101/103).

2. 3-digit 7-segment LED display.

3. TUNER button with multiple functions:

   ■ TUNE MODE: A minus sign signals that the device is in TUNE mode. Press the button briefly to activate this mode. Pressing the button again will return it to preset mode.

   ■ FIRMWARE UPDATE: Press the Tuner button and hold it for around 3 seconds while the device is initialising.

   ■ BRIGHTNESS: Press and hold the button while the device is in operation. The display will first gradually dim, then gradually brighten again. Release the button at the desired level.

4. POWER ON/OFF switches the AC power of the AXON. The LED display is lit when the power is turned on.

Rear panel

1. 12VAC: Connect the power adapter here (12VAC/1.5A).

2. USB: Socket to connect the device to your computer.

3. MIDI IN: The AXON receives all incoming Program Change commands, as well as controller data via this input. A MIDI footswitch to change presets can be connected here.

4. MIDI THRU: All data arriving at MIDI IN is available in unchanged form here.

5. MIDI OUT: All MIDI data generated by your AXON AX 50 USB is available here.

6. INST. OUT: The "normal", unmodified pickup signal of your guitar can be sent through the 13-pin cable, making it available at this socket. The pickups PU 100 and AIX101/103 have an input for the pickup signal of your guitar. Use the included cable to connect the pickup output of your guitar to the minijack socket.

Installation in Windows XP

Driver installation

1. Connect the AXON AX 50 USB to a free USB port (1.1 or 2.0) on your computer and switch the AXON on.

2. A short time later, a pop-up window will appear to indicate that a new device – the AX 50 USB – was found. The Windows installer will complete the installation automatically. The device uses generic drivers already present in your system, making it unnecessary to enter a path to a custom driver. After a few seconds, another pop-up will inform you that the new hardware has been installed and is ready to use.

3. There, you're finished already!

Editor installation

1. Insert the included AXON CD in your drive and wait for the autorun application to launch. If the autorun application on the CD does not launch automatically, start the application manually by double-clicking "Autorun.exe" in the root folder of the CD.

2. Select your language and "AXON Editor" in the following menu. The setup wizard will now appear.

3. The wizard will now display its welcome message.

4. In the following menu, select the path and destination folder.

5. Click "Finish" to complete the installation.

6. Launch the application with Start \ Programs \ TerraTec \ AXON AX 50 USB \ AX 50 USB Editor.

Installation in MAC OS X

Driver installation

1. Connect the AXON AX 50 USB to a free USB port (1.1 or 2.0) on your computer and switch the AXON on.

2. The device uses generic drivers already present in your system, making it unnecessary to enter a path to a custom driver.

3. There, you're finished already!

Editor installation

1. On the CD, the image files are located at "Editor\MAC":

   - AXON_AX_50_USB_Editor_PPC_Vx.x.x.dmg (G4/G5 OS 10.3)

   - AXON_AX_50_USB_Editor_Universal_Vx.x.x.dmg. (G4/G5/Intel OS 10.4 or higher)

2. Mount the correct image for your system by double-clicking and copy the program contained there to your programs folder.

3. The Editor can be launched at System\Programs when the installation is complete.

Launching the software for the first time

The AXON AX 50 USB is now set up and ready to use. The device has two different operating modes:

- Connected to a computer via USB: this gives you access to the full range of parameters and lets you configure the AXON via the editor software. You can also transfer MIDI data to your computer directly via the USB port.

- Stand-alone mode: the AXON is not configurable in this mode, but it responds to all incoming program change commands and controller data from the MIDI IN socket and, of course, sends all MIDI data generated to the output jack.

When switching on the AXON AX 50 USB, the following will appear on the display:

- A dot will appear at the lower right.

- Next, the firmware version number is displayed.

- Finally, the display will switch to the currently selected preset number.

- NOTE: "preset numbers" refer to the memory slots of the AXON AX 50 USB, not the GM sound or another sound number of your sound generator (as is customary on the displays of sound machines).

Tuning

A properly tuned instrument is important for smooth, and above all "fast", operation. We have integrated a tuner in the AXON for that reason. To activate it, press the TUNER button on the front panel.

The display shows the designation of the current string (at higher semitones such as F# or G#, an additional bar will be displayed in the middle character, followed by the indication of whether the string's pitch is too high or low. The information is shown as symbols covering four pitch ranges (1 cent = 1/100 semitone or 1 semitone = 100 cent):

	from +35 to +49 cent
	from +23 to +34 cent
	from +11 to +22 cent
	from +3 to +10 cent
	the pitch is correct
	from -3 to -10 cent
	from -11 to -22 cent
	from -23 to -34 cent
	from -35 to -50 cent

The Computer Editor

To work with the editor, you must connect the AXON AX 50 USB with the computer via the USB interface. MIDI connections (as with the AXON AX 100) are no longer supported. Under "AXON Connection" on the Global page, select the AXON AX 50 USB (USB audio device in Windows) and click "Connect".

Note for Windows users: unfortunately, Windows does not display individual names for USB MIDI devices, so you will always find the AXON under "USB audio device". As the device also provides four additional MIDI ports, please choose the first, unnumbered device when setting up the connection with the editor.

If you have other USB devices connected to your computer, their numbers will be in **parentheses** rather than square brackets:

1: USB audio device	AXON AX 50 USB virtual MIDI port 1
2: USB audio device [2]	AXON AX 50 USB virtual MIDI port 2
3: USB audio device [3]	AXON AX 50 USB virtual MIDI port 3
4: USB audio device [4]	AXON AX 50 USB virtual MIDI port 4
5: USB audio device [5]	AXON AX 50 USB virtual MIDI port 5
6: USB audio device (2)	additional USB audio device port 1
7: USB audio device (2) [2]	additional USB audio device port 2

The editor is now ready to use, letting you remotely control the AXON AX 50 USB in real time and monitor the results. Managing, editing and saving becomes child's play with the editor.

Global

Global Parameters

The global parameters contain all higher-level parameters such as information related to the MIDI channels, the instrument used, the reference tuning and the input sensitivity of the individual strings. A number of settings can be set individually for each instrument that you will be using with the AXON. Check and adapt these settings as necessary before using it for the first time. This is essential to ensure that the AXON will work optimally with your instrument.

Basic Channel (1-16)

Various options are available for sending the MIDI information generated by the AXON from the vibrations of your guitar strings to the sound module or MIDI instrument. Ideally, a MIDI channel is assigned to each string (see STRING MODE SEPARATE) This has the advantage of evaluating each string separately. For example, bending a string affects only that string's channel. Otherwise, bending would affect the pitches of the other strings being played at the same time, an effect that is generally undesirable. Use BASIC CHANNEL to specify the first of six MIDI channels. All other channels follow automatically in ascending order. If you select "1", for example, MIDI channels 1 to 6 will be reserved by your AXON. The value '5' would assign channels 5 to 10, and the value '11' the channels from 11 to 16. '1' is the default value.

Pitchbend Range (0-24)

Bending and sliding are techniques frequently used by guitarists. Your AXON uses the MIDI pitchbend command for these effects. As with a keyboard pitch wheel, the pitch of the last note picked is modified without picking a new note. The value ranges must be adjusted to ensure that the sound module or a connected MIDI instrument reproduces the pitch changes accurately.

The displayed value indicates the maximum number of semitone steps that can be applied to a pitchbend. For most instruments, a value of 12 (one octave) is good. We recommend a setting of 24 for basses. However, please consult your sound generator's manual, as a setting of 2 is also common.

The value "0" disables pitchbend, triggering chromatic semitones when bending or sliding.

Press "Resend" to ensure that the predefined pitchbend range is resent to the external sound generator any time you change the preset.

Tunebase (-99 - +99)

Enter the fine tuning for your instrument here in the -99 to +99 cent range, which is roughly one semitone in either direction. (Strictly speaking, 100 cents are a semitone, but let's not get carried away...) All MIDI notes generated by your AXON are based on the reference frequency of 440 Hz, plus or minus a deviation determined by this parameter. If you are playing with musicians using instruments that are difficult to tune, such as a piano, you can adjust your AXON to the situation. We recommend the following procedure when using a reference frequency other than 440 Hz: start by carefully tuning the open A-string to the reference instrument by ear. Next, press the Autotune button.

Autotune: A pop-up window will appear, prompting you to play the open A-string.
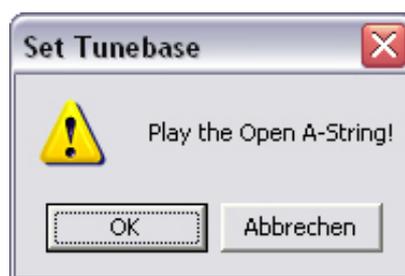
This will adjust the internal tuning of the AXON to suit your instrument. The field next to "Tunebase" will then indicate the value by which the overall tuning of your instrument is deviating from standard pitch.

Guitar Number (1-8)

You can save settings for up to eight different instruments, but if you have a favourite and don't want to use a different instrument for each preset, enter the number of your main instrument here. That is the instrument that will be used by default whenever you have not selected a different one in the presets.

Guitar 1-8

A number of basic settings related to sensitivity and other parameters must be set up to ensure that your AXON works optimally with your guitar. These settings depend on the type and setup of your guitar. They can vary widely from one instrument to the next. However, the AXON stores up to eight sets of basic settings, making it unnecessary to set up the required parameters individually every time – simply choose a guitar preset number with the touch of a button. Click the "Guitar 1 – Guitar 8" buttons to activate a setup.

Instrument Type (Guitar, Bass, Violin, Cello)

Specify the type of instrument you are using here (guitar, bass, violin, or cello). This is especially important for the assignment of the strings to the MIDI channels you specified.

Pickup (Magnetic, Piezo)

Select your pickup system type here. Magnetic is the default mode, for example when using the optionally available pickup AXON PU 100 or AIX 101/103 with its magnetic pickup. The Piezo setting supports polyphonic piezo pickups (available separately). Piezo pickups are designed to reproduce the natural sound of hollow-body instruments as faithfully as possible and have been engineered especially for use with acoustic guitars. An important advantage for guitarists is that piezo pickups, which can be installed invisibly in the bridge of the instrument, can also be used on instruments with nylon strings such as classical guitars.

Note Off Limit (2-30)

Unlike a keyboard, which holds its notes until the key is released, a guitar string will sound until the note dies out naturally or the string is stopped. The duration of the note depends primarily on the type of guitar, how it is set up, and the type of strings used. Some guitars therefore sound percussive, while others have more sustain. This can be represented as an envelope curve in which the volume or amplitude values gradually decline to zero. By specifying a threshold value on this envelope, it becomes possible to control the duration of the note. Selecting a higher value will cause the MIDI Note Off command to be sent sooner, while lower values will result in greater sustain. The AXON can thus be matched optimally to the characteristics of your guitar.

Trigger Level (0-9)

Use this parameter to specify a threshold at which notes should be triggered on your MIDI instrument to suit your playing technique. A low value will ensure that even a weak pick will trigger a "Note On" command. Conversely, a higher value will require a harder pick. Experiment with the values a bit to find your optimal setting.

Wheel Controller (On / Off)

If your pickup does not have a potentiometer (control dial), please specify that here, as the AXON will not receive the correct values and will function incorrectly otherwise. This will only be the case with accessory piezo pickups, however, as the AXON PU 100, AIX 101 and the AIX 103 have such a potentiometer.

Instrument Tuning

Set the actual tuning of your instrument here, so that the AXON can use it as the basis for its further actions. Please do not confuse "Instrument Tuning" with the "MIDI Tuning" on the Preset page. The latter will only work correctly if you enter the correct values here. Either enter the correct pitch for each string individually, or select a tuning via the "Preset" button (which is set to "Normal" the first time you run the Editor). You can also save your own personal tuning by clicking the "Save" button. It will then be stored in the preset list and can be selected as described above. To remove tunings, delete the appropriate file (.axt) in the installation folder (default path: "Program Files\TerraTec\AXON AX 50 USB\Tuning"). For the Mac, this folder is included in the package.

Sensitivity (8-64)

The six sliders in this section control the sensitivity of the inputs at the A/D converter. The scale ranges from 8 to 64, with 64 being the highest sensitivity. For best results, set this value to the highest possible value without overdrive or double triggering.

Overdrive is signalled with O 1 for the E string, O 2 for the B string, O 3 for the G string, etc. Double triggering can be recognised as two tones in short succession after picking the string once.

With the Link button all six sliders can be linked, allowing them to be moved as a single slider.

AXON Connection

Select the devices that you want to control with the Editor here. Please select "USB audio device".

NOTE: unfortunately, Windows does not display individual names for USB MIDI devices, so you will always find the AXON under "USB audio device". As the device also provides four additional MIDI ports, please choose the first, unnumbered device when setting up the connection with the Editor.

Connect: if the AXON AX 50 USB appears in "PC MIDI In Device" and "PC MIDI Out Device" (as USB audio device), please click the "Connect" button. An error message will now appear if the AXON is not correctly installed or the incorrect devices are listed under MIDI devices—otherwise, a window with a progress bar will open and the connection between the computer and the AXON will be established in a few seconds.

Load all settings / Save all settings

Using these buttons, you can save all the device's settings to the hard drive as a SysEx file (Save all settings) and restore them later (Load all settings). This is useful before a firmware update or can be used for general backup purposes.

Firmware Update

We always strive to ensure our products have the highest possible quality. Nevertheless, we sometimes need to fix bugs or add new features. We generally offer new firmware for download on our website for this purpose. Here's how to perform the update:

- **NOTE:** installing a firmware update will overwrite all of your presets. Be sure to save them in a SysEx file before you start!
- Hold the TUNE button while switching on the power of the AXON AX 50 USB. "UPD" will appear in the display.
- The ID of the device changes while in update mode, causing Windows to recognise new hardware and automatically install the drivers.
- Start the software editor now.
- On the GLOBAL page, select the desired firmware file (.axu) in "Firmware Update".
- The display will now show the progress of the upgrade.
- Do not turn the device off at this point!
- When the update is complete, RDY. (ready) will appear on the display to indicate that the upgrade was successful. After restarting, FAC. will be displayed to indicate that the factory settings have been restored.
- Note: if ERR. appears on the display, simply repeat the update process. Don't worry, it's not possible to break anything, as the bootloader is not overwritten.

Presets

Preset Parameters

The Preset parameters contain all of the settings that the AXON needs to manage a preset. A preset is a playing environment that you have defined which contains a wide range of playing and audio property settings that you can select at any time. You can save up to 128 complex programmable presets. The complexity of your presets is entirely up to you. For example, you can organise the strings of your guitar as 12 completely different split areas that can be combined freely. Countless effects and playing parameters can be assigned to each of the splits independently.

Preset Management

Get Preset: calls up the individual presets. Use the arrows to the left and right of the button to navigate the preset memory slots.

Store to: stores the settings to the location shown at the right.

Load from Disk / Save to Disk: loads individual presets from the computer or saves them there.

Preset Name: be sure to give presets you have created a descriptive name to make them easier to find. The name may contain up to 12 characters.

Guitar No. (Global, 1-8)

You can assign a certain instrument to the preset here. Enter the value "Global" to apply all changes to the default guitar on the "Global" page. Alternatively, enter the guitar numbers 1-8.

String mode (Common, Separate)

String mode determines how the strings of your guitar are assigned to the MIDI basic channel (see Global Parameters):

- **Separate Mode:** In Separate mode, a separate MIDI channel is reserved for each string of your guitar (see Global Parameters). This mode provides the greatest possible flexibility. Pitchbend effects such as bending, hammer-on and sliding only affect the channel of the string being played. These techniques can thus be applied without restrictions. Virtually all current MIDI instruments support multiple channels, so choose this mode whenever possible. The currently used channels are shown at the left of the fingerboard graphic for a better overview.

- **Common Mode:** In Common mode, all of the strings of your guitar are assigned to the MIDI basic channel. To prevent conflicts with notes still sounding on the same channel, no pitchbend information is sent when more than one note is being played in this mode. Solo playing is therefore possible with some restrictions. Use this mode if your MIDI instrument can only receive on one MIDI channel. Also, not all sequencer programs support recording multiple channels at the same time. You should also select this mode in this case.

Wheel Controller Pickup

Specify the MIDI controller to be controlled by the wheel controller. The default parameter is "Channel Volume".

NRPN Controller

Many synthesiser manufacturers support the modification of sound properties via so-called NRPN (non-registered parameter number) and RPN (registered parameter number) numbers. RPNs are defined in the MIDI specification; NRPNs are manufacturer-specific. For more information on NRPNs, please refer to the manual of the MIDI output device. The approach is the same for both types: a system parameter is set with the associated (N)RPN-LSB and MSB controllers that can be modified subsequently with controller #6 (DATA ENTRY MSB) or controller #38 (DATA ENTRY LSB).

The following is an example of such an application with your AXON: Let's assume you have read in the manual of your synthesiser that the manufacturer supports filter control via the NRPNs MSB=01h and LSB=21h. Enter the value 01h in the MSB field, and 21h in the LSB field. You have now set up the NRPN and specified that controller #6 (or #38) can be applied to a filter. Pick control and the three possible wheels are now available as sources for the controller #6/#38. If you specify the wheel of the AIX 101 / 103 interface

for the controller #6 (#38), you can now use it to affect the current sound of your synthesiser.

Note: We would advise less-experienced users against using the RPN controllers, as this may affect pitchbend sensitivity and tuning in such a way that your AXON will play incorrect notes.

And another note: Normally, the underlying NRPN or RPN controller should be reset to NULL (7fh) after making changes with the DATA ENTRY controller. The DATA ENTRY controller will then no longer have an effect. Your AXON does not do this, as it would result in an enormous increase in MIDI data. These controllers are reset to NULL when changing presets or changes to the NRPN/RPN itself, however.

Finger Pick (On/Off)

The pitch recognition of the AXON is best suited for use with a pick. You can also get good results with finger picking, however. If you have problems in normal mode, such as double triggering, unplayed or incorrect MIDI notes or the like, please switch "Finger Pick" on. The pick split and pick control functions will no longer be available in this case, as the transient early detection is deactivated.

Splittings (Split 1, Split 2…Split 12)

The playing area (fingerboard and picking position) can be divided in up to 12 different zones, each with its own sound, volume, panorama, etc.

Use the "+" button in the "Split" line to set a split position.

The following dialog is displayed. Select the desired split type here. Though this can be one split, you can also combine multiple splittings:

For example, if a simple string split is selected, this is displayed as follows:
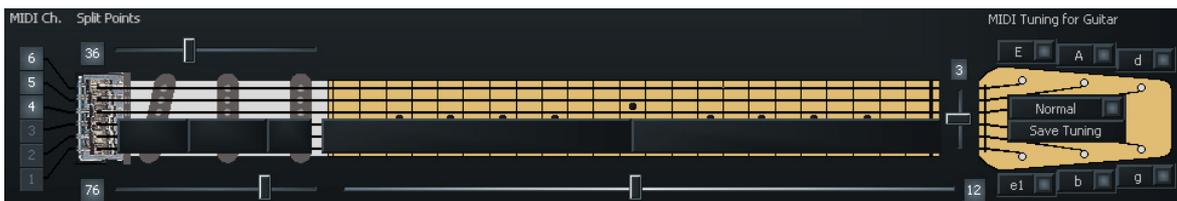
The settings now only apply to the three low strings. Switching to Split 2 inverts the display and the settings then apply to the three high strings.

To delete a split, click the " - " button. This will rejoin the split zone with its neighbour.

If you click the " – " button in an active split (in this case Split 1), you can rejoin the separated playing zones back into this split. To do so, simply enable the corresponding tick box and click "OK".

String Split (1-5, fader at guitar head): When configuring a string split, use this parameter to specify the first string of the lower string segment, i.e. the start of the lower playing zone. The number refers to the string, with the number 1 being the high E string. For example, if you se the string split to 4, the two bass strings (5 and 6) will belong to the upper and the lower four strings (1-4) to the lower split zone.
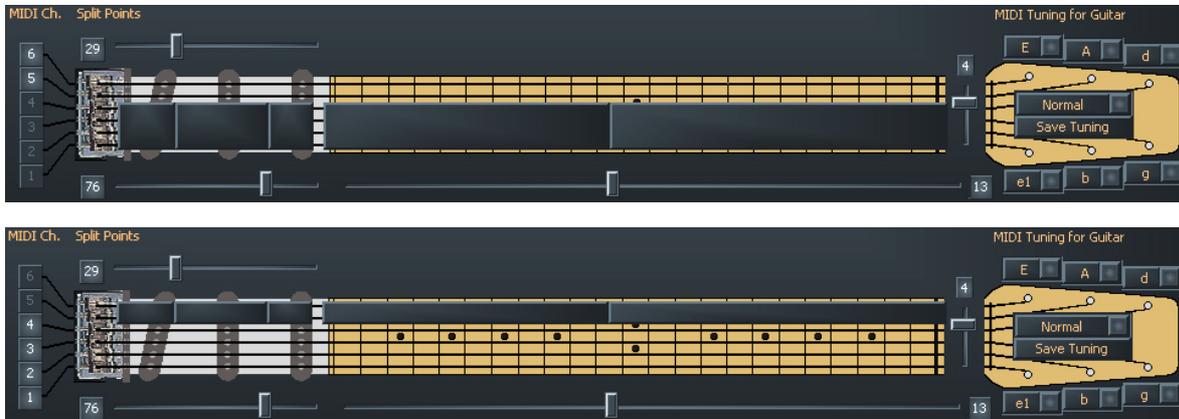
Fret Split (1-23, fader at guitar neck): If you are using a fret split in your preset, use this parameter to specify the first fret of the left split segment, i.e. the left playing zone as seen on the graphic of the AXON. The number refers to the fret numbers, with fret 0 being the open string. For example, if you set the fret split to 4, the open strings and frets 1 through 3 will be assigned to the right split zone, while frets 4 and up will belong to the left split zone.
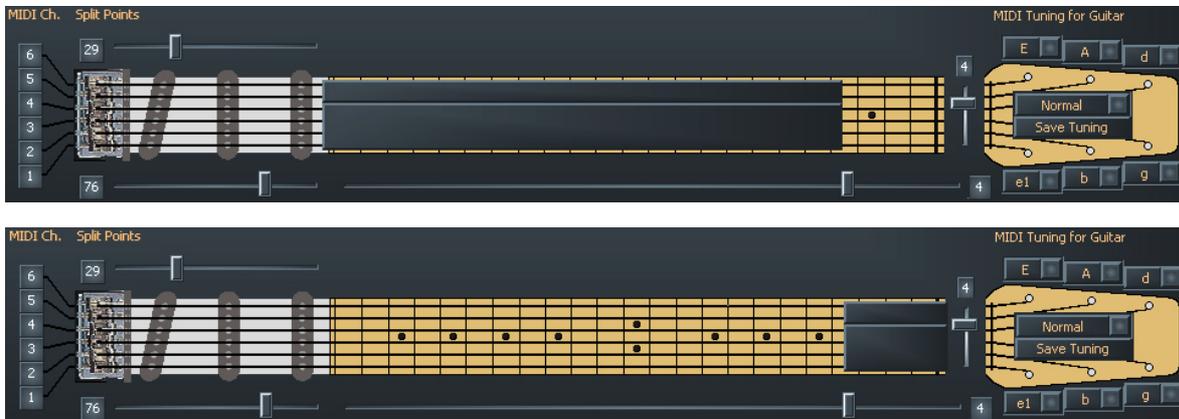
Pick Split 1 and 2 (0-99, faders at the pickups): if you are using pick split options in your preset, these parameters determine the width of the individual picking zones between the bridge and neck. The picking area is divided into 100 units: 0 is the bridge, 99 corresponds to the start of the fingerboard. If you have divided this area into two zones, the parameter in PICK SPLIT 1 will indicate the start of the right picking zone. For example, if you enter 50, the picking area will be divided into two equally large zones. To divide the picking area into 3 zones, specify a value for the start of the third zone in PICK SPLIT 2. For three equally large zones, set the value for PICK SPLIT 1 to 33 and the value for PICK SPLIT 2 to 66. For the "Pick Controller" function (see page **27**), please set PICK SPLIT 1 to 0 and PICK SPLIT 2 to 99.
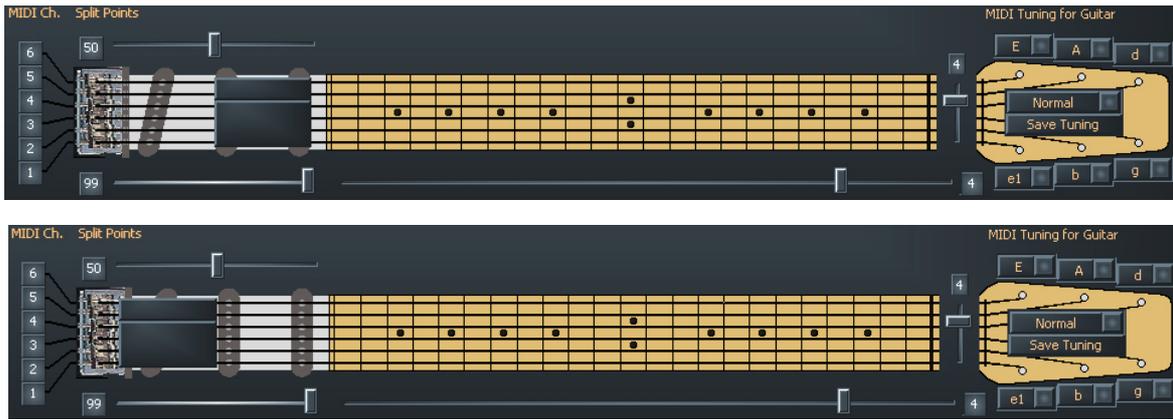
Layer (Layer 1…Layer 4)

Within a split zone, you can create additional layers. This allows you to play multiple instruments at the same time or, in addition to the internal sounds, also activate external sound generators with various Program Change commands and Controller data. You can create up to four layers per split zone, but the total number of layers in a preset is limited to 12. You also have to ensure that the MIDI channels you are using do not overlap. However, as the MIDI standard only provides for 16 channels, you have to enable the output ports of the newly created layers manually. If overlaps result, a warning message appears and you cannot save the preset in that form.

By default, each split has at least one layer that cannot be deleted.

MIDI Output

Channel, (Basic, 1-16): select the MIDI output channel for the layer in your split here. "Basic Channel" applies the channel allocation of the "Global" page. The selected channels are displayed immediately to the left of the fingerboard graphic.

Ports (MIDI OUT, USB 2…5): select the destination (virtual) MIDI ports here. These can be set separately for each layer in the split zone. "MIDI" refers to the physical port on the rear panel of the device, whereas USB 2…5 are the virtual MIDI ports in the driver. Port USB 1 is reserved for communication with the Editor and is thus not available.

Example: set the string split (the fader at the head of the guitar graphic, value range 1–5) to 3 and click the "Split +" button. The lower three strings on the graphic are now marked with a grey bar. Next, click "USB2", so that only that box is lit red. Everything you play over the top three strings will now be sent via USB 2.

A further point will now appear above the "Basic Channel" box: "Split 2" will now be visible next to "Split 1". When this box is selected, the top three strings (i.e. the low ones) will be marked with a grey bar. Next, select "USB 3" as its output path. You can now select a different sound for the three low strings than for the three high ones – it's that simple.

Controller

Program: if this is enabled, the program change command will be sent by the AXON. If it is disabled, no program changes will be sent. This is sometimes useful when recording only the MIDI notes in a sequencer.

Program Number: here (in the small grey box to the right of "Program"), enter the number of the desired program change command to be sent by the AXON for this layer.

Bank MSB, LSB: sound generators with more than 128 sounds often organise their sounds in multiple banks that can be selected via the MSB and LSB values. Please see the sound table of the sound generator for the parameters and their values.

GM Instrument Name: if you are working with a GM sound generator, you can select sounds by name here.

Volume: (0 to 127): the volume for the individual split. Like the others, this controller can be disabled when it is not needed. To do this, just disable the button.

Panorama (-15 to +15): This parameter shifts the selected sound of your MIDI instrument in the stereo image. The values -15... -1 indicate that the current sound will be shifted more toward the left channel, while the values 1...15 would result in a shift toward the right channel. The value 0 corresponds to the middle position.

Pan Spread (-15 to +15): Use this parameter to spread the positions of individual sounds across the panorama to ensure that not all (up to six) tones appear in the stereo position you selected with the Panorama parameter. Set the PAN POS value to MID (middle position), for example. Play your guitar and vary the PAN SPREAD value. Please note that your MIDI instrument must be able to support panorama information. Please refer to the manual of your MIDI instrument for more information.

+15: low sounds to the right, high sounds to the left of the panorama

-15: low sounds to the left, high sounds to the right of the panorama

None, None, None: is not a new pop song, but a further convenient configuration option. In the AX 100, the "Chorus", "Reverb" and "Attack Time" MIDI controllers were fixed; the AXON AX 50 Editor lets you configure them freely.

Pick Control: This submenu lets you associate your current sound with one of the many MIDI controllers. This can be used to control effects thanks to the AXON's ability to recognise your picking position. For example, if you set the value to "Modulation Wheel", you can simulate the effect of a keyboard modulation wheel with your picking position.

Other interesting effects can be achieved with filter control or Panorama, for example. Use the faders Value 1 and 2 to specify the value range of the parameters, for which the controller is suited. The effective range of the controller is restricted to one pick split zone (Your AXON supports up to three pick zones, for which you can theoretically use three different pick controllers). Generally, you will not use additional pick splits for a pick control effect, otherwise the playing area will become very "narrow". Please ensure that the Pick Split 1/2 controls are set to "0" and "99" in order to use the entire range. Otherwise,

only the range within the pick split will be available, not the entire range from the bridge to the fingerboard.

(Pick) Value 1 (0-127): Once you have associated the split zone with a MIDI controller via Pick Controller, use this parameter to set the starting value for the controller. Moving your picking position from the bridge toward the neck will cause the value sent to the MIDI controller to continuously move toward the value set for Value 2.

(Pick) Value 2 (0-127): Once you have associated the split zone with a MIDI controller via Pick Controller, use this parameter to set the end value for the controller. Moving your picking position from the neck toward the bridge will cause the value sent to the MIDI controller to continuously move toward the value set for Value 1.

Notes

Send Notes: If this button is disabled, no more MIDI notes are sent. This can be useful if using the AXON to control a non-sound generator (e.g. effects unit, mixer etc.) using only MIDI controllers.

Transpose (-36 to +36): the MIDI notes can be transposed in pitch. Each step equals a semitone, so +/-12 = +/-1 octave.

Quantize (Auto, Off, On, Trigger): This parameter determines whether pitch changes within the set pitchbend range will be realised continuously or stepwise (quantised):

- **Auto:** If more than one note is played, pitchbend quantisation is enabled automatically. Chords are thus played precisely (without pitchbend), while pitchbend quantisation is disabled for single-note solos with bending, hammer-on, sliding and similar techniques.

- **Off:** No quantisation, continuous pitchbend. All pitch changes (bends, hammer-ons and other techniques) are followed as closely as possible (also see Global: Pitchbend Range).

- **On:** Quantisation with pitchbend in steps. Increases in pitch are NOT followed with pitchbend until the next semitone is reached, at which point the new pitch value is used. Continuous bends and other techniques are not reproduced as expected. This setting is advantageous when playing chords exclusively, as minor changes in pitch due to varying pressure on the strings no longer have any effect.

- **Trigger:** Quantisation through new Note On command. This value disables pitchbend completely, triggering chromatic semitones when bending or sliding. It corresponds exactly to the global setting Pitchbend Range: 0 (see Global Parameters) but only affects the current layer in the split zone. This setting is especially suited to organ or piano sounds, which would otherwise sound extremely unnatural.

Velocity Sensitivity (0-127): You can reduce the dynamic range of your MIDI instrument by reducing the value of this parameter. In an extreme case, a value of 0 will cause all sounds from the MIDI instrument to be played at the same volume, regardless of the velocity with which they are played. The value 127 will result in the greatest possible dynamic range.

Velocity Offset (-64 to +63): If the restricted dynamic range (see Velocity Sensitivity) of your MIDI instrument has caused it to become too loud or soft, use this parameter to raise or lower the overall volume.

MIDI Tuning

Unlike the tuning on the GLOBAL page, this has nothing to do with the actual tuning of your instrument, but with what you want to hear in the end. An example: your guitar is in standard tuning, and the band is playing in D minor because of your guest artist – a Tibetan horn player, whose instrument can only be played in that key. Simply set the tuning under GLOBAL / INSTRUMENT TUNING to "NORMAL", and on the PRESET page, set the MIDI TUNING to D-MINOR—your guitar will now be correctly transposed.

You can also experiment at random with different instrument and MIDI tuning values – you'll be surprised at the odd keys your instrument suddenly can handle.

CC Defaults

Global | Presets | CC Defaults | MIDI Mapping | About

Controller	Value	Controller	Value	Controller	Value	Controller	Value	Controller	Value
Bank Select MSB	0	CC #24	0	CC #48	0	Release Time	64	Data Increment	0
Modulation Wheel	0	CC #25	0	CC #49	0	Attack Time	64	Data Decrement	0
Breath Controller	0	CC #26	0	CC #50	0	Brightness	64	NRPN LSB	0
CC #3	0	CC #27	0	CC #51	0	Decay Time	64	NRPN MSB	0
Foot Controller	0	CC #28	0	CC #52	0	Vibrato Rate	64	RPN LSB	0
Portamento Time	0	CC #29	0	CC #53	0	Vibrato Depth	64	RPN MSB	0
Data Entry MSB	64	CC #30	0	CC #54	0	Vibrato Delay	64	CC #102	0
Channel Volume	0	CC #31	0	CC #55	0	CC #79	0	CC #103	0
Balance	0	Bank Select LSB	0	CC #56	0	General Purpose #5	0	CC #104	0
CC #9	0	CC #33	0	CC #57	0	General Purpose #6	0	CC #105	0
Panorama	64	CC #34	0	CC #58	0	General Purpose #7	0	CC #106	0
Expression Controller	127	CC #35	0	CC #59	0	General Purpose #8	0	CC #107	0
Effect Control 1	0	CC #36	0	CC #60	0	Portamento Control	0	CC #108	0
Effect Control 2	0	CC #37	0	CC #61	0	CC #85	0	CC #109	0
CC #14	0	Data Entry LSB	0	CC #62	0	CC #86	0	CC #110	0
CC #15	0	CC #39	0	CC #63	0	CC #87	0	CC #111	0
General Purpose #1	0	CC #40	0	Damper Pedal On/Off	0	CC #88	0	CC #112	0
General Purpose #2	0	CC #41	0	Portamento On/Off	0	CC #89	0	CC #113	0
General Purpose #3	0	CC #42	0	Sustenuto On/Off	0	CC #90	0	CC #114	0
General Purpose #4	0	CC #43	0	Soft Pedal On/Off	0	Reverb Send Level	0	CC #115	0
CC #20	0	CC #44	0	Legato Footswitch	0	Effects 2 Depth	0	CC #116	0
CC #21	0	CC #45	0	Hold 2	0	Chorus Send Level	0	CC #117	0
CC #22	0	CC #46	0	Sound Variation	0	Effects 4 Depth	0	CC #118	0
CC #23	0	CC #47	0	Timbre/Harmonic Intens.	64	Effects 5 Depth	0	CC #119	0

Controller reset values

Using the various control options of the wheel and pick control functions requires a precise reset of the MIDI controller to its default values (i.e. after a preset change). This is generally the value 0, but there are exceptions. A wide range of free controllers are available that manufacturers can use as they see fit, so your AXON lets you set default values for all available controllers.

The table is already filled with default values. All controllers reserved according to the MIDI specification were given default values. Refer to the manual of your MIDI sound generator to set the value of the controller used to the value recommended by the manufacturer.

MIDI Mapping
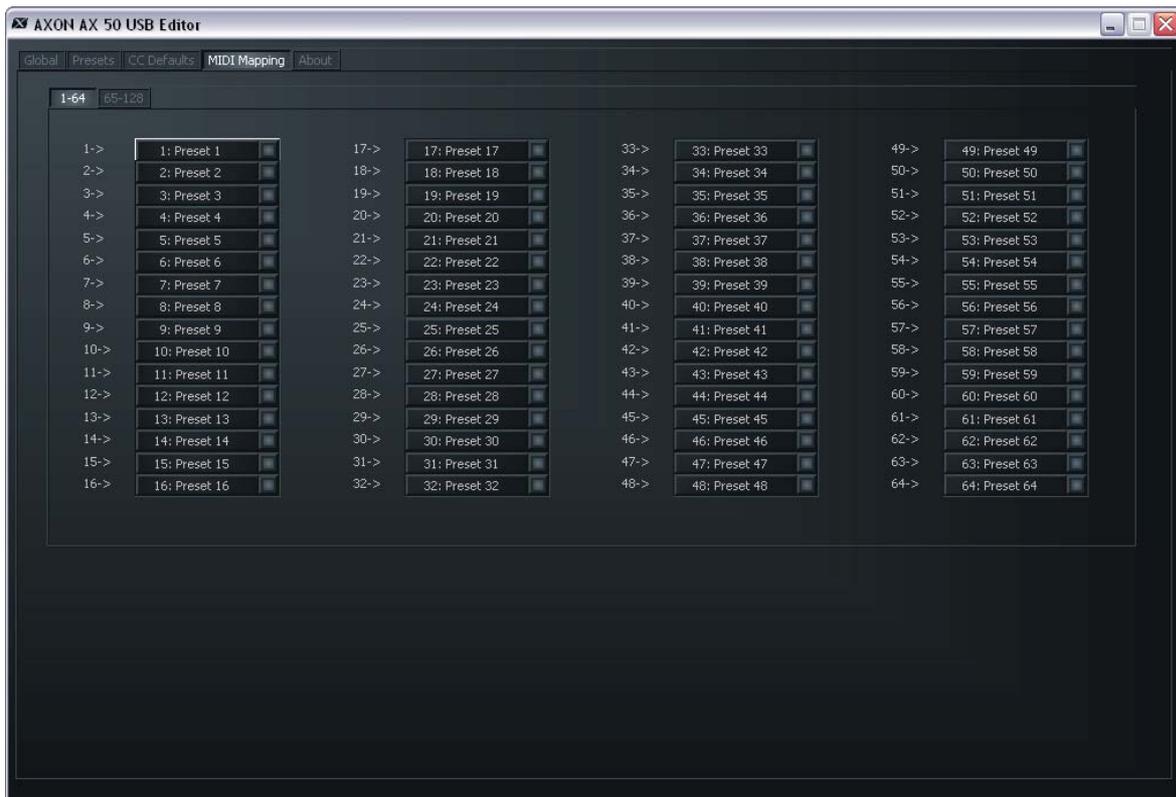
Program Change commands

Commands received by your AXON on the current basic channel via the MIDI IN socket can be assigned to any AXON presets using this mapping table. By default, a Program Change command will select the AXON preset with the same program number. To change this setting, select the desired preset from the drop-down menu. Your entries will be adopted by the AXON immediately and do not need to be saved manually.

Practical Examples

1. AXON AX 50 USB plus WAVE XTABLE VI

Do you work with the AXON Guitar-to-MIDI System and your guitar or bass is your favourite instrument for writing tracks? Look forward to the well thought-out combination of AXON AX 50 USB plus WAVE XTABLE VI.

NOTE: WAVE XTABLE VI is a complex piece of software, and we urgently recommend reading the included manual, as we can't cover all of its possibilities here.

When WAVE XTABLE VI is launched, a so-called multi-instrument (GM.nkm) is loaded automatically. The player then responds to all incoming program change commands, letting you select the sounds you need in the AXON Editor. These are then loaded in the player and are available immediately.

To use other libraries, close GM.nkm in the Load/Save menu, and "feed" the player manually.

To take full advantage of the AXON's capabilities, open six instruments in WAVE XTABLE VI and set them to the MIDI channels you have assigned to individual strings in the AXON.

You can open the same instrument six times or choose six different ones.

2. AXON in combination with a software sequencer (here: Cubase 4)

In our example, we are using Cubase 4 to describe the use of the virtual MIDI ports and the possibilities they present. Let's start by dividing the fingerboard into two split zones, assigning Split 1 to the USB 2 port and Split 2 to USB 3.
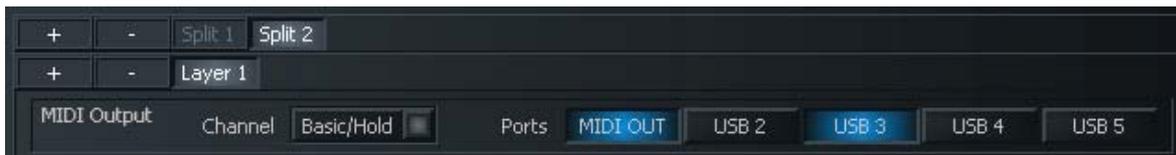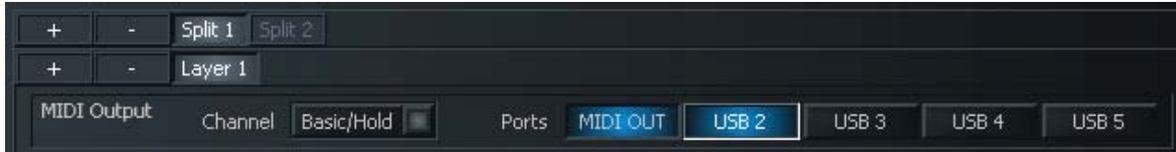
In Cubase, select the MIDI input for each track. Assign track MIDI 01 to the input USB audio device [2], and track MIDI 02 to USB audio device [3]. Now you can change the assigned sound simply by switching the track, without the need for any changes on the AXON.

3. AXON in combination with notation software (here: Sibelius G7)

Again, in this case it's only necessary to select the input device. Select the "Play/Devices" menu item to open the dialog box shown below. Select the input devices USB audio device [2], USB audio device [3], etc.
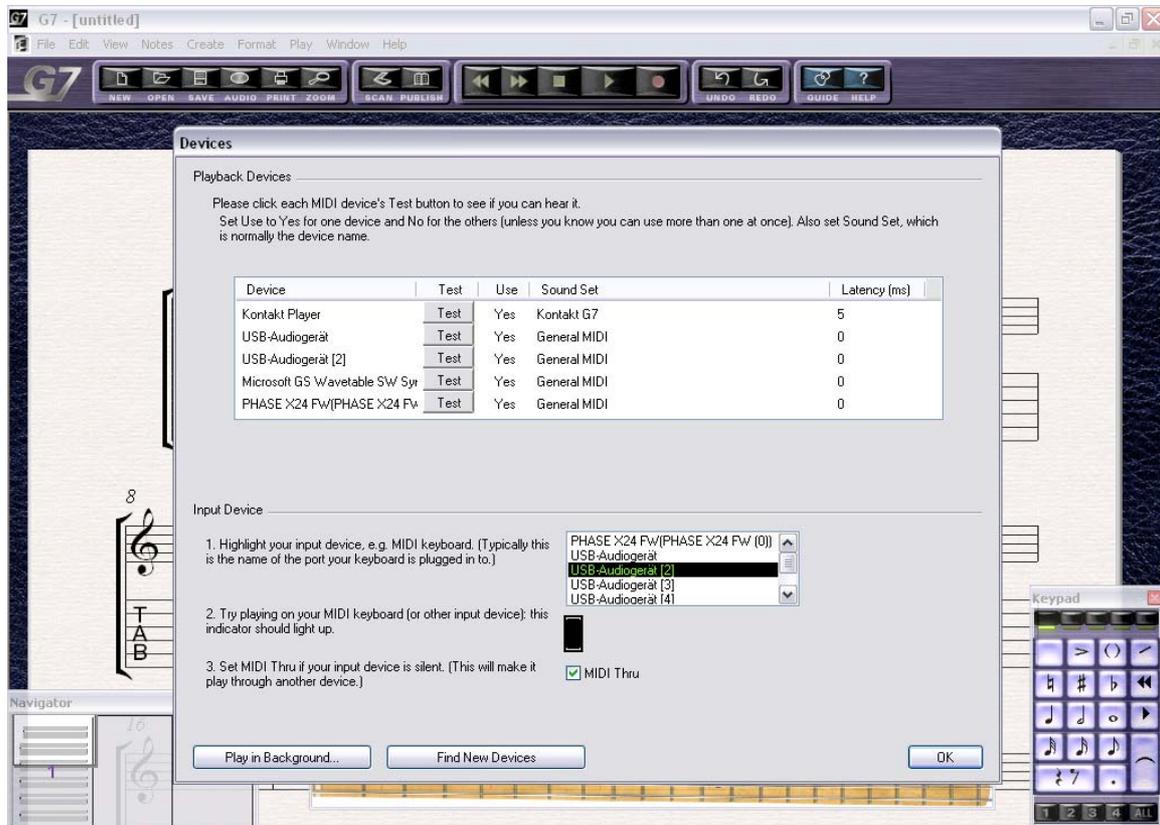
Appendix

Factory Reset

Unlike the AXON 100, the AXON 50 USB will not do a hardware reset. Instead, the Editor's installation folder (default: "Program Files\TerraTec\AXON AX 50 USB" contains a SysEx file ("Default.syx") with the basic settings that you can apply via the LOAD button on the GLOBAL page.

Pitches on the Fingerboard

1		3		5		7		9			12
E	F	F#	G	G#	A	A#	B	c	c#	d	d#	e
A	A#	B	c	c#	d	d#	e	f	f#	g	g#	a
d	d#	e	f	f#	g	g#	a	a#	b	c1	c#1	d1
g	g#	a	a#	b	c1	c#1	d1	d#1	e1	f1	f#1	g1
b	c1	c#1	d1	d#1	e1	f1	f#1	g1	g#1	a1	a#1	b1
e1	f1	f#1	g1	g#1	a1	a#1	b1	c2	c#2	d2	d#2	e2

13		15		17		19		21			24
f	f#	g	g#	a	a#	b	c1	c#1	d1	d#1	e1
a#	b	c1	c#1	d1	d#1	e1	f1	f#1	g1	g#1	a1
d#1	e1	f1	f#1	g1	g#1	a1	a#1	b1	c2	c#2	d2
g#1	a1	a#1	b1	c2	c#2	d2	d#2	e2	f2	f#2	g2
c2	c#2	d2	d#2	e2	f2	f#2	g2	g#2	a2	a#2	b2
f2	f#2	g2	g#2	a2	a#2	b2	c3	c#3	d3	d#3	e3

C2   C1   C   c   c1   c2   c3   c4   c5
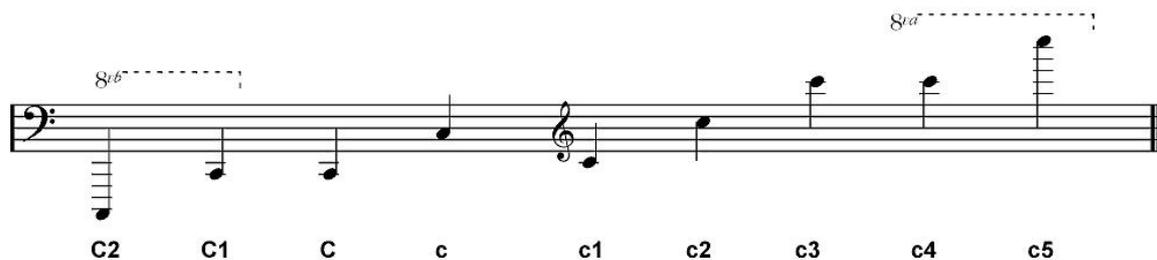
Pin Assignment of 13-pin Socket

4. Analog signal e-string (1)

5. Analog signal B-string (2)

6. Analog signal G-string (3)

7. Analog signal D-string (4)

8. Analog signal A-string (5)

9. Analog signal E-string (6)

10. Analog magnetic pickup signal

11. Direct current volume

12. N.C.

13. Down-button

14. Up-button

15. +7V

16. -7V

Shield: Ground

MIDI Implementation Chart

MIDI Implementation Chart v. 2.0 (Page 1 of 3)			
Manufacturer: TerraTec Electronic GmbH	Model: AXON AX 50 USB	Version: 6.00	Date: 18.09.2006
	Transmitted	**Recognized**	**Remarks**
1. Basic Information			
MIDI channels	1-6	1	Default Values; All channels 1-16 can be used
Note numbers	0-126	No	
Program Change	0-127	0-127	Receive: Mapped to Presets 1-128
Bank Select response? (Yes/No)		No	
If yes, banks utilized			
Modes Supported (Yes/No)			
Multi (Mode 5)		No	
Poly (Mode 3)		No	
Omni (Mode 1)		No	
Mono (Mode 2)		No	
"Guitar" (Mode 4)		No	
Note On Velocity (Yes/No)	Yes	No	
Note Off Velocity (Yes/No)	No	No	
Channel Aftertouch (Yes/No)	No	No	
Poly (Key) Aftertouch (Yes/No)	No	No	
Pitch Bend (Yes/No)	Yes	No	
Active Sensing (Yes/No)	No	No	
System Reset (Yes/No)	No	No	
Tune Request (Yes/No)	No	No	
System Exclusive messages supported (Yes/No)	No	No	
Sample Dump Standard	No	No	
Device Inquiry (General Information)	No	No	
File Dump	No	No	
MIDI Tuning	No	No	
Master Volume	No	No	
Master Balance	No	No	
Notation Information	No	No	
Turn GM System On	No	No	
Turn GM System Off	Yes	No	Described in "MIDI SysEx Implementation"
Other (note in Remarks column)			
NRPNs (Yes/No)	No	No	
RPN 00 (Pitch Bend Sensitivity) (Yes/No)	Yes	No	
RPN 01 (Fine Tuning) (Yes/No)	Yes	No	
RPN 02 (Coarse Tuning) (Yes/No)	No	No	
RPN 03 (Tuning Program Select) (Yes/No)	No	No	
RPN 04 (Tuning Bank Select) (Yes/No)	No	No	
2. MIDI Timing and Synchronization			
MIDI Clock (Yes/No)	No	No	
Song Position Pointer (Yes/No)	No	No	
Song Select (Yes/No)	No	No	
Start (Yes/No)	No	No	
Continue (Yes/No)	No	No	
Stop (Yes/No)	No	No	
MIDI Time Code (Yes/No)	No	No	
MIDI Machine Control (Yes/No)	No	No	
MIDI Show Control (Yes/No)	No	No	
If yes, MSC Level supported			
3. Extensions Compatibility			
General MIDI compatible? (Yes/No)		No	
If yes, is GM default power-up mode? (Yes/No)		No	
DLS compatible? (Yes/No)		No	
If yes, DLS Level(s) supported			
If yes, can DLS files be imported? (Yes/No)			
If yes, can DLS files be exported? (Yes/No)			
Importation of Standard MIDI Files (Yes/No)		No	
If yes, Types supported		No	
Exportation of Standard MIDI Files (Yes/No)			
If yes, Types supported			

NOTES

[1] Any Controller is recognized on Basic channel. It is ignored if it is already assigned internally. It is re-transmitted on the incoming channel when Stringmode = Common. It is re-transmitted on the incoming channel and the 5 following channels when Stringmode = Separate. In this table "Recognized" is only marked with "Yes" if the controller has a function additional to these assignments.

[2] Any Controller between 0 and 119 can be transmitted when assigned to the Wheel or used with one of the 3 Zone Controllers or the Pickcontrol feature. In this table "Transmitted" is only marked with "Yes" if the controller has a function additional to these assignments.

[3] The effective Volume/Pan value depends not only on the incoming controller value, but also on several internal parameters

Control #	Function	Transmitted (Y/N) [2]	Recognized (Y/N) [1]	Remarks
	MIDI Implementation Chart v. 2.0 (Page 2 of 3)			
	Manufacturer: TerraTec Electronic GmbH Model: AXON AX 50 USB Version: 6.00 Date: 18.09.2006			
0	Bank Select (MSB)	Yes	No	See Patchlist for banks used
1	Modulation Wheel (MSB)	No	No	
2	Breath Controller (MSB)	No	No	
3		No	No	
4	Foot Controller (MSB)	No	No	
5	Portamento Time (MSB)	No	No	
6	Data Entry (MSB)	No	No	
7	Channel Volume (MSB)	Yes	Yes [3]	
8	Balance (MSB)	No	No	
9		No	No	
10	Pan (MSB)	Yes	Yes [3]	
11	Expression (MSB)	No	No	
12	Effect Control 1 (MSB)	No	No	
13	Effect Control 2 (MSB)	No	No	
14		No	No	
15		No	No	
16	General Purpose Controller 1 (MSB)	No	No	
17	General Purpose Controller 2 (MSB)	No	No	
18	General Purpose Controller 3 (MSB)	No	No	
19	General Purpose Controller 4 (MSB)	No	No	
20		No	No	
21		No	No	
22		No	No	
23		No	No	
24		No	No	
25		No	No	
26		No	No	
27		No	No	
28		No	No	
29		No	No	
30		No	No	
31		No	No	
32	Bank Select (LSB)	Yes	No	
33	Modulation Wheel (LSB)	No	No	
34	Breath Controller (LSB)	No	No	
35		No	No	
36	Foot Controller (LSB)	No	No	
37	Portamento Time (LSB)	No	No	
38	Data Entry (LSB)	No	No	
39	Channel Volume (LSB)	No	No	
40	Balance (LSB)	No	No	
41		No	No	
42	Pan (LSB)	No	No	
43	Expression (LSB)	No	No	
44	Effect Control 1 (LSB)	No	No	
45	Effect Control 2 (LSB)	No	No	
46		No	No	
47		No	No	
48	General Purpose Controller 1 (LSB)	No	No	
49	General Purpose Controller 2 (LSB)	No	No	
50	General Purpose Controller 3 (LSB)	No	No	
51	General Purpose Controller 4 (LSB)	No	No	
52		No	No	
53		No	No	
54		No	No	
55		No	No	
56		No	No	
57		No	No	
58		No	No	
59		No	No	
60		No	No	
61		No	No	
62		No	No	
63		No	No	

Control #	Function	Transmitted (Y/N) [2]	Recognized (Y/N)	Remarks
	MIDI Implementation Chart v. 2.0 Control Number Information (Page 3 of 3)			
	Manufacturer: TerraTec Electronic GmbH Model: AXON AX 50 USB Version: 6.00 Date: 18.09.2006			
64	Sustain Pedal	No	No	
65	Portamento On/Off	No	No	
66	Sostenuto	No	No	
67	Soft Pedal	No	No	
68	Legato Footswitch	No	No	
69	Hold 2	No	No	
70	Variation	No	No	
71	Timbre / Harmonic Intensity	No	No	
72	Release Time	No	No	
73	Attack Time	No	No	
74	Brightness	No	No	
75	Decay Time	No	No	
76	Vibrato Rate	No	No	
77	Vibrato Depth	No	No	
78	Vibrato Delay	No	No	
79	Sound Controller 10	No	No	
80	General Purpose Controller 5	No	No	
81	General Purpose Controller 6	No	No	
82	General Purpose Controller 7	No	No	
83	General Purpose Controller 8	No	No	
84	Portamento Control	No	No	
85		No	No	
86		No	No	
87		No	No	
88		No	No	
89		No	No	
90		No	No	
91	Reverb Send Level	No	No	
92	Effects 2 Depth	No	No	
93	Chorus Send Level	No	No	
94	Effects 4 Depth	No	No	
95	Effects 5 Depth	No	No	
96	Data Increment	No	No	
97	Data Decrement	No	No	
98	Non-Registered Parameter Number	Yes	No	
99	Non-Registered Parameter Number	Yes	No	
100	Registered Parameter Number	Yes	No	
101	Registered Parameter Number	Yes	No	
102		No	No	
103		No	No	
104		No	No	
105		No	No	
106		No	No	
107		No	No	
108		No	No	
109		No	No	
110		No	No	
111		No	No	
112		No	No	
113		No	No	
114		No	No	
115		No	No	
116		No	No	
117		No	No	
118		No	No	
119		No	No	
120	All Sound Off	No	No	
121	Reset All Controllers	No	No	
122	Local Control On/Off	No	No	
123	All Notes Off	No	No	
124	Omni Mode Off	No	No	
125	Omni Mode On	No	No	
126	Poly Mode Off	No	No	
127	Poly Mode On	No	No	

Troubleshooting

No output to external MIDI sound generator.

When I play my guitar, the AXON responds in Tuning mode on the display, but the MIDI output device does not play.

Possible fault: Cabling/setup

Solution:

- Ensure that the MIDI cables are correctly connected (from the MIDI OUT of your AXON to the MIDI IN of your synthesiser).
- The MIDI channels of both instruments must be set correctly.
- When in separate mode, the synthesiser should be in multi-mode (device receiving on all channels).
- MIDI volume must not be set to "0".
- If your MIDI pickup does not have a volume control, ensure that "Wheel Controller" is disabled in the instrument setup on the Global page.
- Ensure that the 3-position switch of the pickup is not set to "Guitar", as that would set the MIDI volume to "0".
- Also ensure that the audio cable from your synthesiser to the amplifier is intact and correctly connected.

Bending doesn't work properly.

I hear the right note when I pick a string, but hammer-on, pull-off and bending does not work.

Possible problem: The pitchbend settings of the AXON and the external device may not match, or "Quantize" is enabled.

Solution:

- Check whether the pitchbend range settings of the external MIDI device match those of the AXON (GLOBAL).
- Ensure that the QUANTIZE value in the preset is set to AUTO or OFF.

I get partially incorrect notes.

When I play, the notes I hear are either partially or completely wrong.

Possible problem: Tuning discrepancy.

Solution:

■ Tune your guitar using the AXON tuning aid. If you need to tune the AXON to match your guitar, use the Autotune function on the GLOBAL page.

■ Ensure that you have selected the correct instrument tuning (Global), and check the MIDI tuning (presets).

■ The transposition function may be accidentally enabled in the preset. Disable transposition.

■ Your MIDI output device may also be incorrectly tuned or transposed. Make sure that all of the values in your sound generator are correct.

Differing string volumes

One or more strings is too loud or soft in relation to the others.

Possible source of problem: the sensitivity of the individual strings is not set correctly, or the spacing between the pickup and strings is not even.

Solution:

■ Adjust the sensitivity (Global/Sensitivity) of the affected string(s) in the AXON.

■ Check the installation of the pickup. Ensure that the spacing between the strings and magnets is as even as possible. Contact a guitar technician if necessary.

Strong differences in the dynamics of individual notes

What can I do about extremely irritating, strong dynamic differences between individual notes?

Possible problem: Incorrect velocity parameters.

Solution:

■ The velocity settings (Velocity) of the AXON must be suitable to the sound of the output device. Try reducing the velocity sensitivity parameter and increasing the velocity offset parameter.