



# AXiS

## Natural Keyboard



### USER MANUAL

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- Relocate either AXiS and its associated equipment and cabling or the equipment affected by the interference.
- Utilise different mains power outlets. Try installing a filter in the mains of the other equipment.
- In the case of radio interference where 300 ohm ribbon antennas are used, try changing to 75 ohm coaxial cable.

If for any reason you should need additional information relating to radio and TV interference, you may find a booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio/TV Interference Problems". This booklet is available from the U.S. Government Printing Office, Washington D.C. 20402, Stock #004-000-00345-4.



This product is fully compliant with the European EMC Directive 89/336/EEC which applies to apparatus which is "liable to cause electromagnetic disturbance or is itself liable to be affected by such disturbance".

Test performed and passed are:

EN50082-1 : 2002

EN55022 : 2002 Class B

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MIDI refers to the Musical Instrument Digital Interface published by the MIDI Manufacturer's Association

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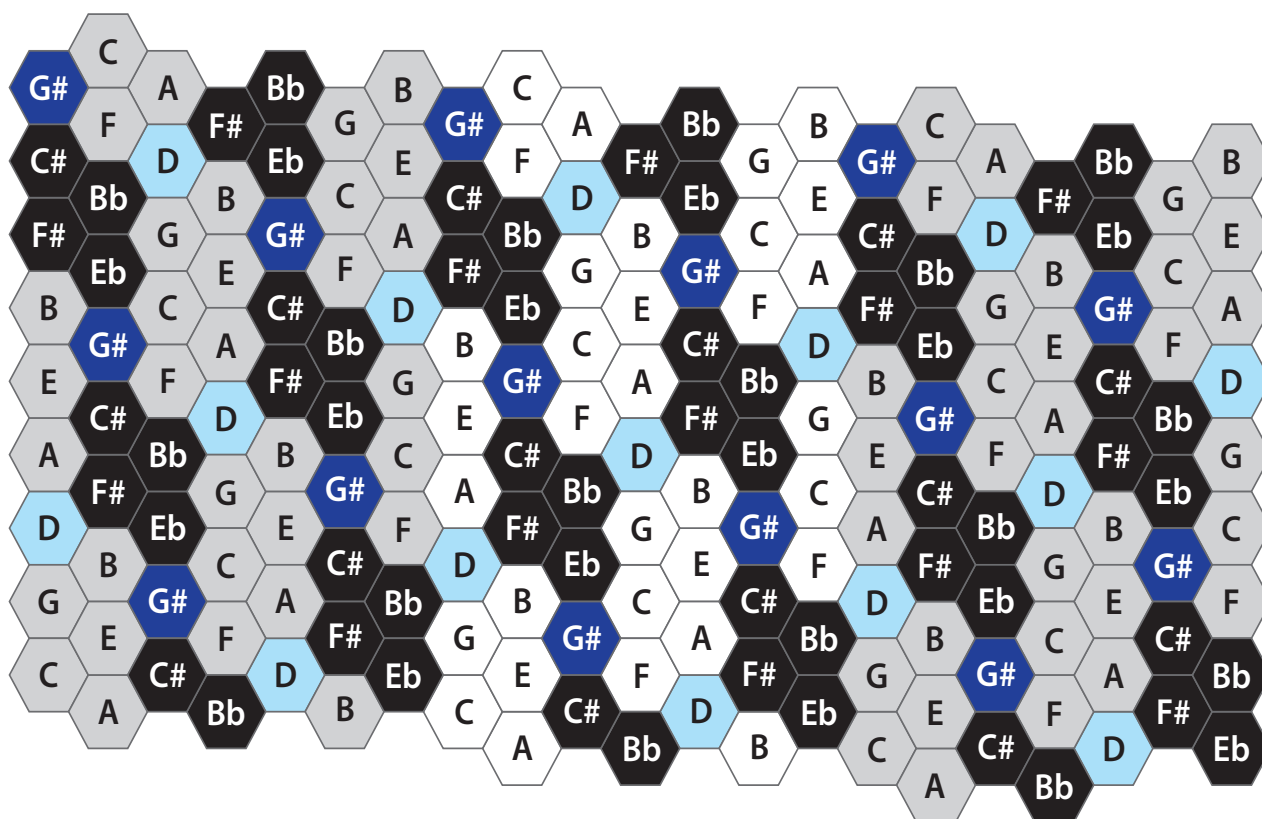
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# Introduction

The AXiS 64 Natural Keyboard is a MIDI controller Music Interface. It uses the Harmonic Table musical note layout which provides a geometric overview of musical notes and their harmonies. This makes the AXiS easy and fun to use.















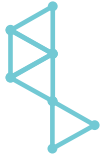
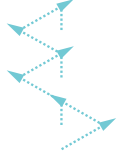




## THE HARMONIC TABLE NOTE MAP



Notes on the Harmonic Table increase in pitch going up (5ths) and going to the right (semitones). As you can see there is more than one instance of each note. To clarify, see the octave map on the next page.

Diagonal lines contain either augmented or diminished chords. See chord shapes on page 7.



Shape	Direction	Chord
		     <p>Major Triad      Major 7th      Major 9th      Major 11th      Major 13th</p>
		     <p>Minor Triad      Minor 7th      Minor 9th      Minor 11th      Minor 13th</p>
		    <p>Dominant 7th      Dominant 9th      Dominant 11th      Dominant 13th</p>

The AXiS can help you greatly expand your creativity, control and productivity in your live or studio MIDI set-up. Whether you are using one multi-timbral sound module or a rack full of them, the AXiS's Natural Keyboard layout will help you expand your creative abilities.

Aside from its use of the Harmonic Table, the AXiS works in a similar way to other MIDI controllers. It can be used as a MIDI input device, playing notes and chords like a pianoforte style "master keyboard". It can also give you a central point of control over your slave modules in a given MIDI network.

The AXiS has very flexible and simple calibration routines so that a range of external controls can be accommodated.

# Quick Start

- 1 Plug the AXiS into the power supply using the Power Adapter provided.
- 2 Plug the MIDI OUT socket on AXiS to MIDI IN socket on your synthesizer, sound expander or other MIDI device.
- 3 Press PLAY.
- 4 AXiS is now ready to use.

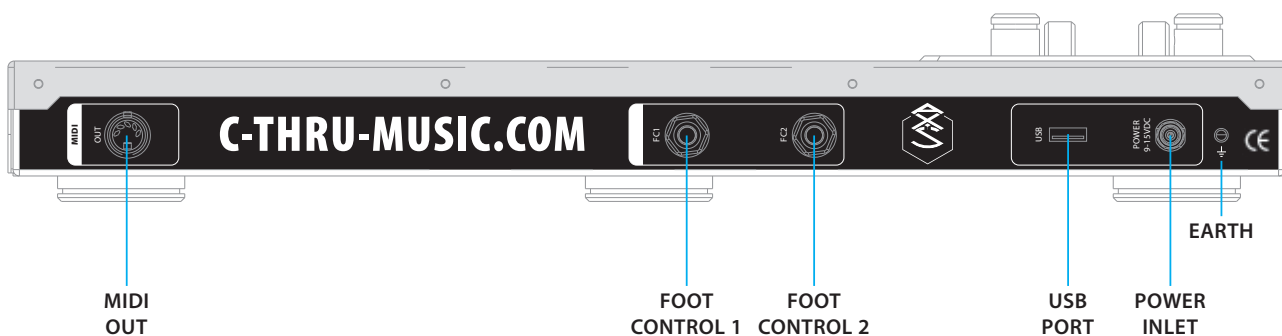


# Installation

## GENERAL

Please take the normal precautions for siting an electronic instrument, do not place on a source of direct heat, in direct sunlight or near another instrument that may cause or be subject to interference.

## CONNECTIONS



<b>MIDI OUT</b>	Connect to a MIDI IN of another device.
<b>USB</b>	May be connected to a computer via USB port for downloading firmware upgrades.
<b>FC1, FC2</b>	Works with most available pedals and foot switches, and possibly some other controls.
<b>Power Inlet</b>	Always use the Power Adapter provided.
<b>Earth Point</b>	Use if required for your live or studio set-up.

## POWER

It is always best to use the Power Adapter provided with the original equipment.

The Power Adapter is a simple wall connector, which plugs directly into the power inlet on the back of AXiS.

AXiS runs on 9 – 15 VDC and draws a current of 300mA.

## POWER UP & RESET

Plug the Power Adapter into the Power Inlet. Plug the Power Adapter into the mains supply.

The red PWR light glows reassuringly. If not...

- Check that the light on the Power Adapter is on, if not:
- Check mains is switched on and the cable is fully plugged in
- Check the fuse in the mains plug if it has one
- Check the DC cable & connector for damage

On power up, AXiS goes through a Power-up Sequence as follows:

- shows a start-up page on the display with software version number
- self-test
- puts the PLAY page on the display

When this sequence is complete the LCD is lit.

If the red PWR light is on and the LCD is lit and otherwise AXiS is not working, contact C Thru Music on 0845 260 5556 or email support@c-thru-music.com.

*Note: When AXiS is sending MIDI data, the green SND light flickers – if you are not receiving MIDI data, check your equipment.*

## SHUTDOWN

Hold down 'PLAY' and press 'UTIL'.

Press + to confirm or - to cancel.

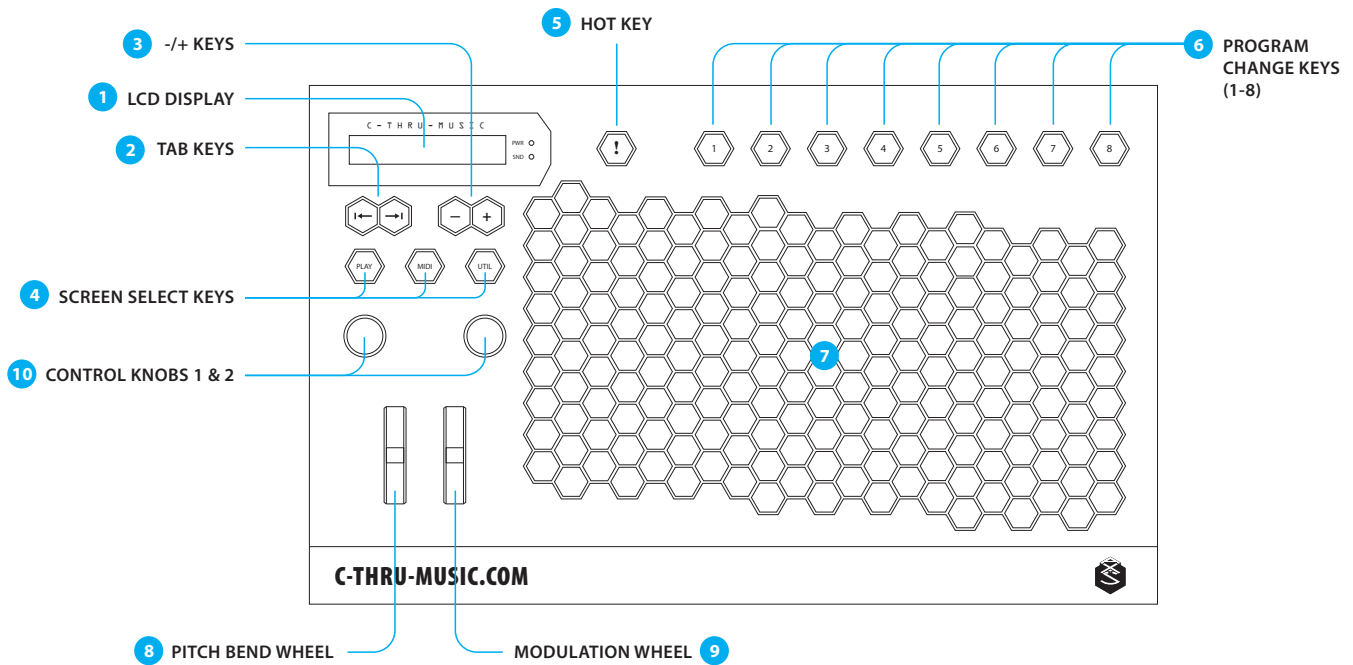
## MEMORY STORAGE WITHOUT POWER

Memory is retained for approx 10 years without power, so normally all settings will be the same on power up as when powered down.

If memory is lost,

- you will be given the option to restore factory settings.
- you must recalibrate all controls. (See Calibrate under UTIL pages).

# Operation



On the front panel:

- 1 LCD display displays a series of screens which can be used to modify settings.
- 2 TAB keys. Use to move back and forth between functions.
- 3 + / - keys. Use to increment or decrement the current setting.
- 4 Screen Select Keys. Three keys used to select the Play, MIDI and Utility screens.
- 5 Hot Key. Sends 'All Notes Off', 'Reset All Controllers', 'Clear' or a 'Panic' MIDI sequence.
- 6 Eight Program Change keys. These are short-cut keys used to select a single program (instrument) from the current group of eight.
- 7 Main Keyboard. 192 keys in total, there is more than one instance of the same note on the keyboard.
- 8 Pitch bend wheel. Self-centring wheel normally assigned to the pitch bend control.
- 9 Modulation wheel. Similar to the pitch bend wheel but not self-centring. The default assignment is the modulation control.
- 10 Control Knobs. A pair of control knobs with the default assignments of left knob = Volume and right knob = After touch.

All panel control knobs, wheels and remote analogue inputs (foot controls etc.) may be assigned to any high or low resolution MIDI controller. See MIDI screen section for more details.

**OVERVIEW**

The “natural keyboard” in the main body of the instrument is set out according to the Harmonic Table note layout, details of which may be found on the Internet. Operating these keys transmits musical note information for playing notes on a connected MIDI device.

Additional on-board control is provided through two Knobs, a Pitch Bend wheel, and Modulation wheel. There is also support for two external Foot Controls.

Edit keys are used to modify settings shown on the Display. These settings determine how AXiS will behave. Pages shown on the Display are changed with the Page keys.

A ! (Hot) Key and Choice keys (1-8) provide useful one-key shortcuts.





**LIGHTS**

To the right of the Display there are two indicator lights;

<b>PWR light</b>	Red light indicating that the internal microprocessor is running
<b>SND light</b>	Green light indicating that MIDI messages are being sent

**EDIT KEYS**

There are four edit keys. From left to right:

Key	Name	Action
	Back-Tab	Cursor to previous field
	Tab	Cursor to next field
	Minus	Decrement
	Plus	Increment / Select

+ and - keys will repeat if held down.

- Use the Back-Tab and Tab keys to move the flashing cursor between fields.
- Use the - and + keys to change a value.

**PAGE KEYS**

The Display shows a single page at any given time, normally with a flashing cursor. There are three keys to navigate between pages.



**PLAY** puts the AXiS into normal playing mode, and shows a page giving access to make changes to Program, Group, and Bank.

Pressing **MIDI** or **UTIL** scrolls from **PLAY** page, through various **MIDI** or **UTIL**ity related pages, and back again to **PLAY**.

See MIDI pages and UTIL pages below.

**CHOICE KEYS**

Eight Choice keys (1-8) can be found along the top. Choice keys choose a Program from the current Group of eight shown in the Play page.



**HOT KEY**

The **!** key can be found to the right of the Display.

The action taken by the Hot key in normal operation can be chosen in a UTIL page.

# MIDI pages

## TRANSCOPE

Choose a number of semitones by which to transpose musical notes. Range -24 to +25 semitones.

## TRANSMIT CHANNEL

Select the channel on which to output MIDI information. Select 1 to 16.

## ASSIGN CONTROL

Assign each control to a MIDI parameter.

Control	Default/Factory
PBendWheel	Pitch Bend
Mod Wheel	Modulation
FootCntr 1	Foot Pedal
FootCntr 2	Sustain
KnobCntr 1	Volume
KnobCntr 2	Aftertouch

## INVERT CONTROL

Each control may operate normally or inverted. Inverted operation may be useful if you have a control that works the opposite way to that which you prefer. Eg Volume controlled by a pedal may be set to be high when the foot is all the way back, or high when the foot is all the way forward.

### VELOCITY TABLE

Select a velocity table from five available. These tables determine how velocity information is interpreted.

Factory defaults are as follows:

Table	Use for
1	Normal
2	Sensitive
3	Less sensitive
4	Yamaha (always <100/127)
5	Disabled (always = 64/127)

*Notes:*

- *Table 4 is set up to be useful on some equipment which expects the maximum level to be 100 rather than the full 127 possible MIDI values.*
- *Table 5 is set up for velocity insensitive operation and will make all notes have a MIDI value of 64 for velocity.*

### RUNNING STATUS

**On/Off** When set On redundant Channel Status bytes are removed from the Output data according to Running Status protocol to reduce possible accumulative delays.

This is reset after any 90ms pause to ensure that Data does not become separated from its Status.

### ACTIVE SENSING

**On/Off** When set On, a MIDI Active Sensing Clock (FEh) is automatically generated approximately every 90ms whenever no MIDI data is being transmitted.

This feature is essential for some MIDI devices that require Active Sensing and will shut down if not received within 300ms of the last MIDI byte received.

# UTIL pages

## LCD BACKLIGHT

The light on the Display is turned off after a period of inactivity. Set the delay between last activity and light off from the following values:

**On, 15secs, 30 secs, 1 min and Off**

## HOT KEY ASSIGN

The Hot key may be assigned to transmit one of the following:

- Clear + Panic!
- Clear
- Panic!
- All Notes Off (on all MIDI channels)
- Reset All Controllers (on all MIDI channels)
- (Off)

Details of Events and Clear/Panic sequences can be found in the Reference section.

## NOISE MARGIN

Set the number of bits of noise to ignore.

**Min 6 bits / Max 13 bits**

All the AXiS control inputs have an independent noise filter that defaults to 6 bits wide. Under certain electrically noisy conditions (Eg stage lighting interference being picked up by the foot control leads) it may be necessary to increase this value.



## CALIBRATE

Choose a control and calibrate its center, upper and lower limits.

**N.B. AXiS does NOT send MIDI while in this page.**

Do this when;

- AXiS has lost its memory through long term disuse, or
- when you add a new external control, or
- when you change an external control for another, or
- a control is not working as you wish.

The Calibrate page displays the Control name at the top with Min: and Max: below as 0 – 1023 (decimal).

If using a footswitch or on/off control;

- click the footswitch or control to the other position
- Press the + or – key to confirm
- The displayed readings will change to “-----”
- Calibration is now complete.

If using a continuously variable control;

- Move the control to its minimum and maximum positions.  
The display shows low and high values.
- Ensure you move the control back to its central position
- Press the + or – key to confirm
- The displayed readings will change to “-----”
- Calibration is now complete.

*Note: The values shown never go all the way to 0 or 1023 unless the Noise Margin is zero. They are always the margin short of each end.*

**N.B. All controls must have a “centre” because any may be assigned as a Pitchbend. The “center” of an on/off switch coincides with either the minimum or maximum.**

# Reference

## ONLINE RESOURCES

AXiS support page [www.c-thru-music.com/support](http://www.c-thru-music.com/support)  
 MIDI Manufacturers Association [www.midi.org](http://www.midi.org)

## USER-SERVICABLE PARTS

There are no user-servicable parts. Contact C Thru Music for advice.

## CLEAR AND PANIC!

'Clear' and 'Panic!' are sequences of MIDI data which may be sent by using the Hot! key.

<b>Off</b>		Key does nothing
<b>All Notes Off</b>	send	[All Notes Off] for each channel
<b>Reset all Controllers</b>	send	[Reset all Controllers] for each channel
<b>Clear</b>	send	[All Notes Off] and [Reset All Controllers] for each channel
<b>Panic</b>	send	[All notes off} [Reset All Controllers] [All sound Off] [Centre Pitch Bend] [Zero Modulation] [Sustain Off} [Volume on] [individually turn of each note for each channel] [Active Sensing]

Delays are inserted in the above string to ensure the MIDI output buffer does not overflow. At this time, there is no support to load alternative events to the Hot Key but there is sufficient memory to support this feature.

*Note: The Clear and Panic! sequences are sent as a series of blocks, with "Block delays" between them.*

# Appendix A Controller Numbers

The following MIDI controllers may be assigned to any of the analogue controls in the MIDI assign screen.

0-63	High resolution continuous controllers (0-31 = MSB; 32-63 = LSB)	42	Pan
64-69	Switches	43	Expression Controller
70-119	Low resolution continuous controllers	44	Effect Control 1
120-127	Channel Mode messages	45	Effect Control 2
		48	General Purpose Controller 1
		49	General Purpose Controller 2
		50	General Purpose Controller 3
		51	General Purpose Controller 4

## High resolution continuous controllers (MSB)

0	Bank Select ( Not assignable)
1	Modulation Wheel
2	Breath Controller
4	Foot Controller
5	Portamento Time
6	Data Entry
7	Channel Volume
8	Balance
10	Pan
11	Expression Controller
12	Effect Control 1
13	Effect Control 2
16	General Purpose Controller 1
17	General Purpose Controller 2
18	General Purpose Controller 3
19	General Purpose Controller 4

## Switches

64	Sustain On/Off
65	Portamento On/Off
66	Sostenuto On/Off
67	Soft Pedal On/Off
68	Legato On/Off
69	Hold 2 On/Off

## Low resolution continuous controllers

70	Sound Controller 1
71	Sound Controller 2
72	Sound Controller 3
73	Sound Controller 4
74	Sound Controller 5
75	Sound Controller 6
76	Sound Controller 7
77	Sound Controller 8
78	Sound Controller 9
79	Sound Controller 10
80	General Purpose Controller 5
81	General Purpose Controller 6
82	General Purpose Controller 7
83	General Purpose Controller 8
84	Portamento Control
91	Ext. Effects Depth
92	Tremelo Depth

## High resolution continuous controllers (LSB)

32	Bank Select (Not assignable)
33	Modulation Wheel
34	Breath Controller
36	Foot Controller
37	Portamento Time
38	Data Entry
39	Channel Volume
40	Balance

- 93 Chorus Depth
- 94 Celeste Depth
- 95 Phaser Depth

**Channel Mode messages**

- 120 All Sound Off
- 121 Reset All Controllers
- 122 Local Control On/Off
- 123 All Notes Off
- 124 Omni Mode Off (also causes ANO)
- 125 Omni Mode On (also causes ANO)
- 126 Mono Mode On (Poly Off; also causes ANO)
- 127 Poly Mode On (Mono Off; also causes ANO)

# Appendix B. Program Change (Instrument) Assignment Bank 1

This chart shows the numbers and names of all 128 General MIDI Instruments which you are likely to find in your MIDI sound equipment. These are arranged into sixteen “families” of eight instruments.

<b>PIANO</b>	<b>CHROMATIC PERCUSSION</b>	<b>ENSEMBLE</b>	<b>BRASS</b>
1 Acoustic Grand	9 Celesta	49 String Ensemble 1	57 Trumpet
2 Bright Acoustic	10 Glockenspiel	50 String Ensemble 2	58 Trombone
3 Electric Grand	11 Music Box	51 SynthStrings 1	59 Tuba
4 Honky-Tonk	12 Vibraphone	52 SynthStrings 2	60 Muted Trumpet
5 Electric Piano 1	13 Marimba	53 Choir Aahs	61 French Horn
6 Electric Piano 2	14 Xylophone	54 Voice Oohs	62 Brass Section
7 Harpsichord	15 Tubular Bells	55 Synth Voice	63 SynthBrass 1
8 Clavinet	16 Dulcimer	56 Orchestra Hit	64 SynthBrass 2
<b>ORGAN</b>	<b>GUITAR</b>	<b>REED</b>	<b>PIPE</b>
17 Drawbar Organ	25 Nylon String Guitar	65 Soprano Sax	73 Piccolo
18 Percussive Organ	26 Steel String Guitar	66 Alto Sax	74 Flute
19 Rock Organ	27 Electric Jazz Guitar	67 Tenor Sax	75 Recorder
20 Church Organ	28 Electric Clean Guitar	68 Baritone Sax	76 Pan Flute
21 Reed Organ	29 Electric Muted Guitar	69 Oboe	77 Blown Bottle
22 Accoridan	30 Overdriven Guitar	70 English Horn	78 Skakuhachi
23 Harmonica	31 Distortion Guitar	71 Bassoon	79 Whistle
24 Tango Accordion	32 Guitar Harmonics	72 Clarinet	80 Ocarina
<b>BASS</b>	<b>SOLO STRINGS</b>	<b>SYNTH LEAD</b>	<b>SYNTH PAD</b>
33 Acoustic Bass	41 Violin	81 Lead 1 (square)	89 Pad 1 (new age)
34 Electric Bass(finger)	42 Viola	82 Lead 2 (sawtooth)	90 Pad 2 (warm)
35 Electric Bass(pick)	43 Cello	83 Lead 3 (calliope)	91 Pad 3 (polysynth)
36 Fretless Bass	44 Contrabass	84 Lead 4 (chiff)	92 Pad 4 (choir)
37 Slap Bass 1	45 Tremolo Strings	85 Lead 5 (charang)	93 Pad 5 (bowed)
38 Slap Bass 2	46 Pizzicato Strings	86 Lead 6 (voice)	94 Pad 6 (metallic)
39 Synth Bass 1	47 Orchestral Strings	87 Lead 7 (fifths)	95 Pad 7 (halo)
40 Synth Bass 2	48 Timpani	88 Lead 8 (bass+lead)	96 Pad 8 (sweep)

**SYNTH EFFECTS**

97 FX 1 (rain)  
98 FX 2 (soundtrack)  
99 FX 3 (crystal)  
100 FX 4 (atmosphere)  
101 FX 5 (brightness)  
102 FX 6 (goblins)  
103 FX 7 (echoes)  
104 FX 8 (sci-fi)

**ETHNIC**

105 Sitar  
106 Banjo  
107 Shamisen  
108 Koto  
109 Kalimba  
110 Bagpipe  
111 Fiddle  
112 Shanai

**PERCUSSIVE**

113 Tinkle Bell  
114 Agogo  
115 Steel Drums  
116 Woodblock  
117 Taiko Drum  
118 Melodic Tom  
119 Synth Drum  
120 Reverse Cymbal

**SOUND EFFECTS**

121 Guitar Fret Noise  
122 Breath Noise  
123 Seashore  
124 Bird Tweet  
125 Telephone Ring  
126 Helicopter  
127 Applause  
128 Gunshot

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