// ZWI OVERVIEW // [FRONT]

// MOUTHPIECE //

Breathe into this to increase the amplitude of the ZWI output. Additional parameters can be mapped to this, such as filter cutoff frequency, resonance and LFO rate/depth. The mouthpiece has a bite sensor for vibrato control.

// KEYS //

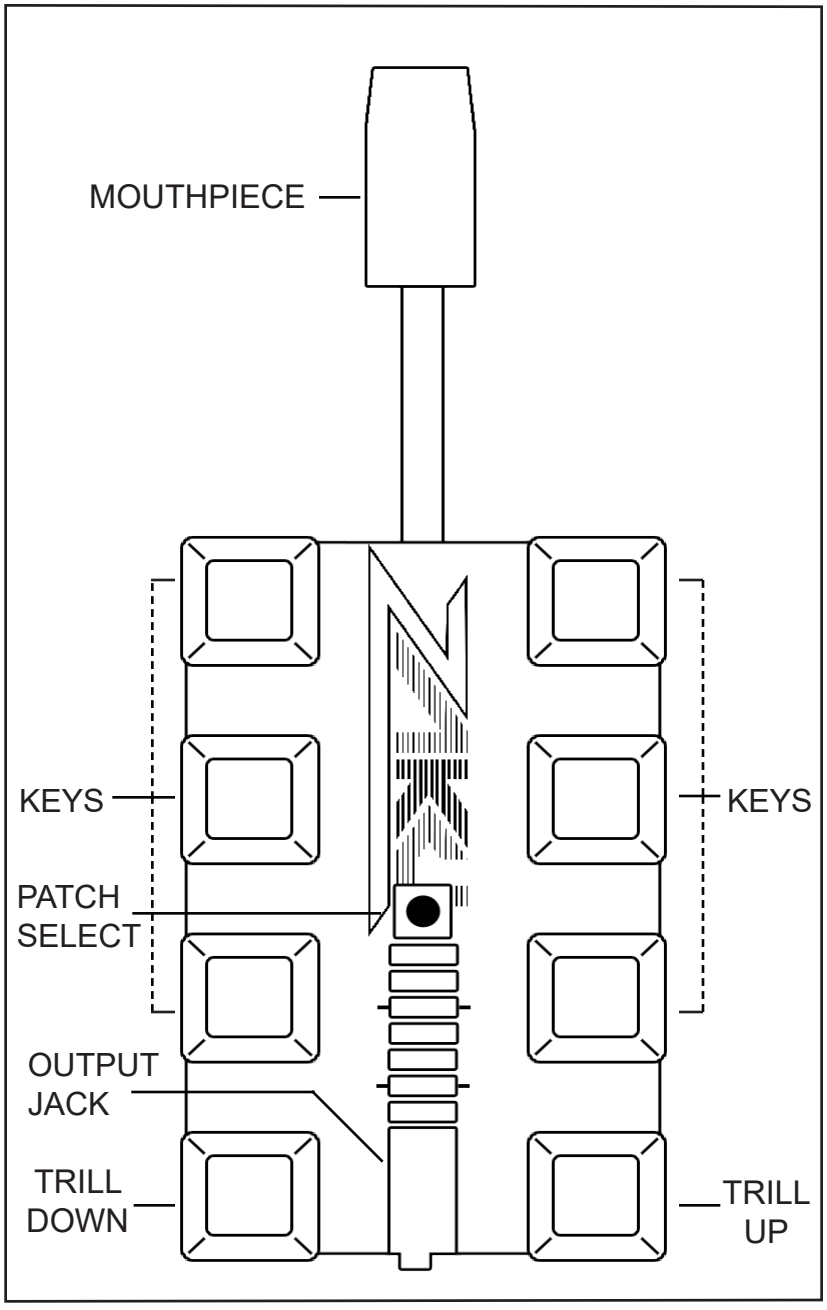
These are the primary means of changing the pitch of the ZWI. A finger chart can be found as an table later in this manual.

// TRILL KEYS //

These keys change the pitch by one semitone in the corresponding direction. If both keys are pressed, it will change the pitch by one whole tone in the direction of the first trill key pressed.

// PATCH SELECT //

Hold this button and press a single key or trill key to switch to the patch saved in the corresponding slot. Holding this button and pressing an octave key or pitch bend key (located on back of ZWI) will enter calibration mode for the respective setting for that key.



// OUTPUT JACK //

This 3.5mm jack is one of two means of audio output from the ZWI. It offers lower fidelity audio than direct USB output, but can be used with headphones or amplifiers without any additional equipment. The volume is controlled by the left knob on the back of the ZWI.

// ZWI OVERVIEW // [BACK]

// OCTAVE KEYS //

These keys will adjust the pitch up or down one full octave. If both keys are pressed, the pitch will change two octaves in the direction of the first key pressed.

// PITCH BEND //

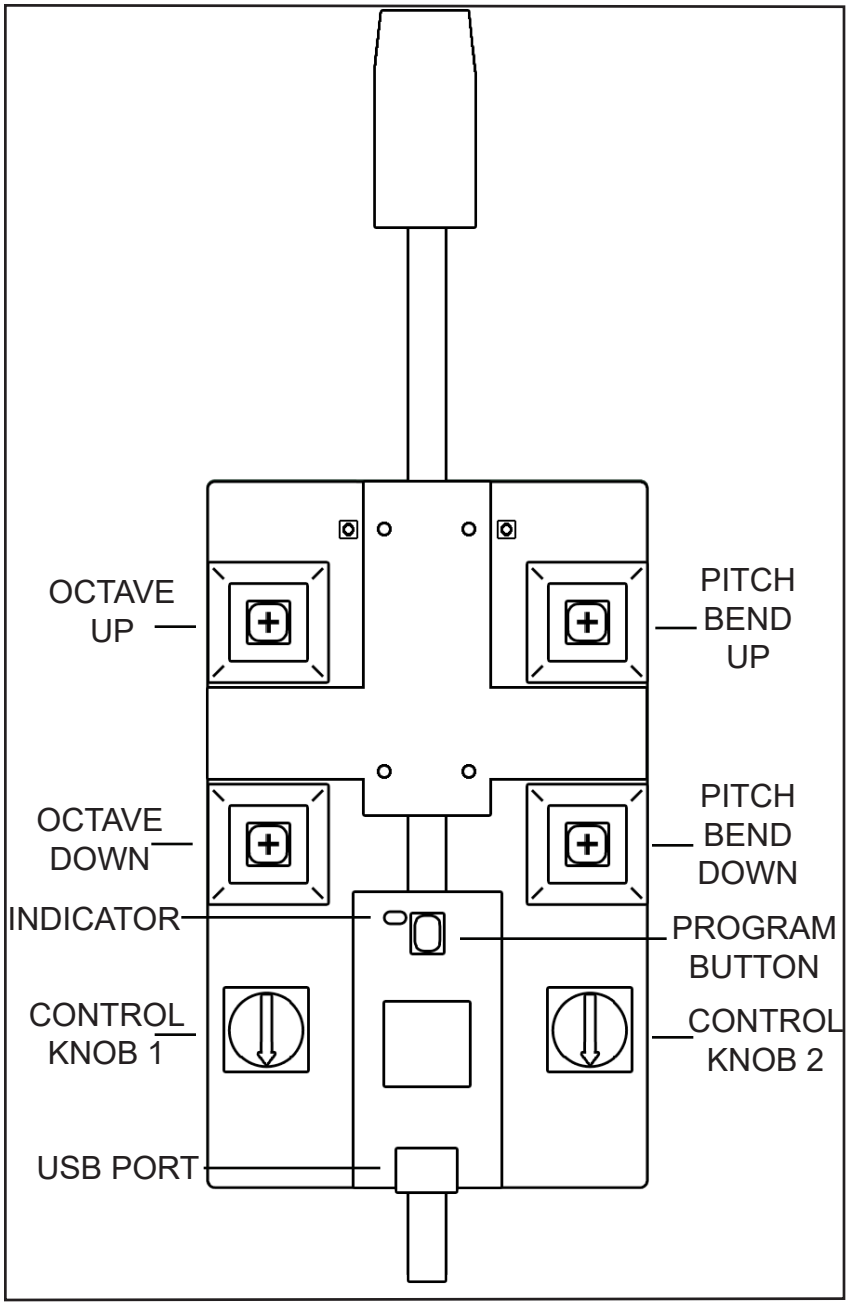
These keys will gradually bend the pitch in the direction pressed. If both keys are pressed at once, portamento will be enabled.

// CONTROL KNOB //

These knobs are used to configure various settings on the ZWI. By default, CONTROL KNOB 1 will adjust the output jack volume, and CONTROL KNOB 2 will adjust the USB out volume. Adjusting other settings with these knobs will be covered in the section labeled 'ZWI SETUP'.

// PROGRAM BUTTON //

This is the program button for the Teensy 4.0 microcontroller at the core of the ZWI. It is only used when updating the ZWI. For more detail, see 'UPDATING THE ZWI'.



// USB PORT //

The USB port is used to power the ZWI, as well as for PC connectivity for patch editing, updating, MIDI out, and audio out. The audio provided from this port will be a higher fidelity than the audio from the output jack, and is recommended for recording. Power can be provided by any USB source, such as a PC or battery power pack.

// ZWI SETUP // [OVERVIEW]

To set up your ZWI, you will need to configure the following GLOBAL controls:

-Key Delay:
  -The length of the grace period between key combination changes before the pitch changes. This is used to prevent accidental tones when going between pitches that require several different keys to be pressed.

-Breath Threshold:
  -The minimum amount of breath pressure required to make the ZWI produce sound.

-Breath Sensitivity:
  -How much breath pressure is required to reach full volume.

-Bite Threshold:
  -The threshold at which the bite sensor will begin to change pitch of the note being played.

-Bite Sensitivity:
  -The amount that the pitch will vary when the bite sensor is engaged.

Setting up the ZWI can be done in two ways:
-Using the browser-based ZWI patch editor
-Using the control knobs on the back of the ZWI

A detailed setup procedure will be provided for each method on the next two pages.

// ZWI SETUP // [PATCH EDITOR]

To use the ZWI patch editor, connect your ZWI to your computer via USB and either open the patch editor located at [https://editor.zaku.band/], or download it from [https://github.com/RobbyVocke/ZWI-wind-synthesizer] for offline use. Google Chrome is recomended, as the patch editor may not display or function properly in other browsers.

Make sure your ZWI is connected by selecting ‘TEENSY MIDI/AUDIO’ under device. If ‘TEENSY MIDI/AUDIO’ is not listed, try refreshing your browser. All settings pertaining to ZWI setup will be found in the ‘GLOBAL’ section, and can be saved to your ZWI by clicking ‘SAVE TO ZWI’ to save your current patch. If you change patches before saving your settings, the settings will revert to the last saved settings.

RECOMMENDED SETUP PROCEDURE:

Breath threshold: calibrate this setting first by setting it all the way down, and increasing the threshold until the [INDICATOR] LED on the back of the ZWI turns off.

Breath sensitivity: adjust this setting so your preferred amount of breath pressure is required to play the ZWI at full volume.

Bite threshold: calibrate this setting first by setting it all the way down, and consistently blow through the mouthpiece. Increase the slider or knob until the pitch of the ZWI lowers to it’s standard pitch. Continue blowing through the mouthpiece while biting and releasing the mouthpiece to test that it bends the pitch up and down. If the pitch bend is releasing with too long of a delay, raise the bite threshold until a shorter delay is achieved. If you would like to disabled the bite sensor entirely, raise the bite threshold fully.

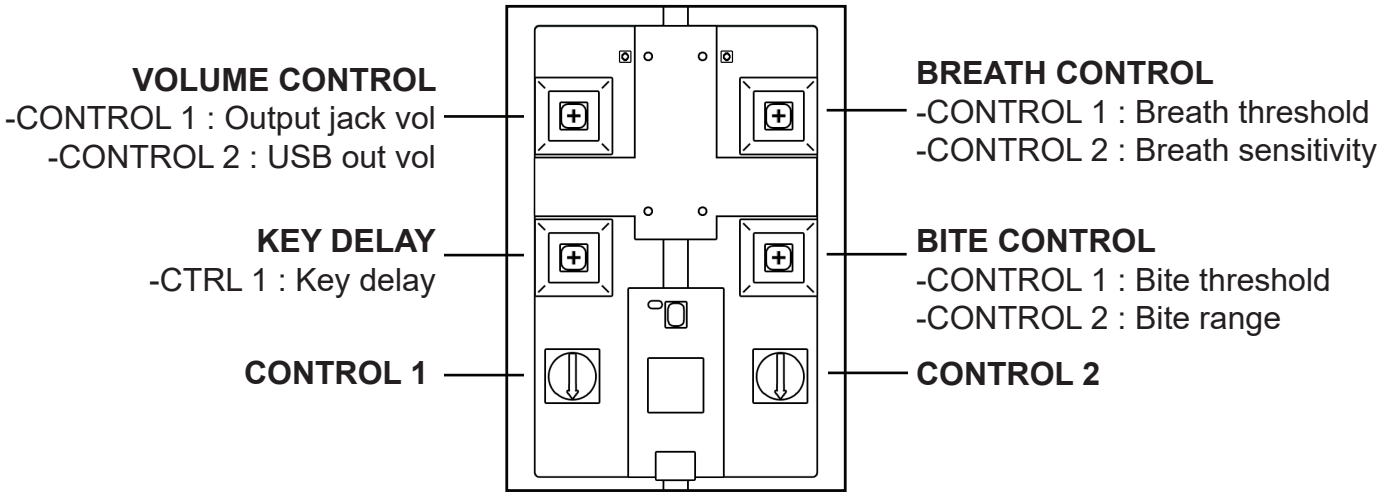
Bite sensitivity: adjust this setting while blowing through the mouthpiece and biting and releasing the mouthpiece. Adjust the slider until your preferred pitch bend amount is achieved.

Key delay: Play the ZWI and adjust this to a spot where you will not accidentally trigger passing notes when changing multiple keys, and there is an acceptable amount of latency. This is most noticable when passing through octaves. (Eg: passing from D down to C, or C up to D.)

// ZWI SETUP //

[ZWI CONTROLS]

To use the control knobs on the back of the ZWI, you will need to enter the setting modes by pressing a corresponding key while holding the [PATCH SELECT] button. After pressing the key combination, the function of the control knobs will change. The setting will automatically save when another mode is selected.



Breath threshold: While holding [PATCH SELECT] press the [OCTAVE UP] key. Turn [CONTROL KNOB 1] fully counter-clockwise. The [INDICATOR] LED will turn ON if the breath sensor is not being engaged, and OFF if it is. Increase the threshold until the [INDICATOR] LED on the back of the ZWI turns ON, and no sound is being produced.

Breath sensitivity: After adjusting the breath thresdhold, turn [CONTROL KNOB 2] fully counter-clockwise, and turn it up while blowing into the mouthpiece until the desired breath sensitivity is reached.

Bite threshold: While holding [PATCH SELECT] press the [PITCH BEND UP] key. Turn [CONTROL KNOB 1] fully counter-clockwise. The [INDICATOR] LED will turn OFF indicating that the bite sensor is reading above it's threshold. Turn [CONTROL KNOB 1] clockwise until the [INDICATOR LED] turns off, and the desired release time is reached when biting the mouthpiece.

Bite sensitivity: Turn [CONTROL KNOB 2] fully counter-clockwise. Turn [CONTROL KNOB 2] clockwise while blowing through the mouthpiece and biting and releasing the mouthpiece. Adjust until your preferred pitch bend amount is achieved.

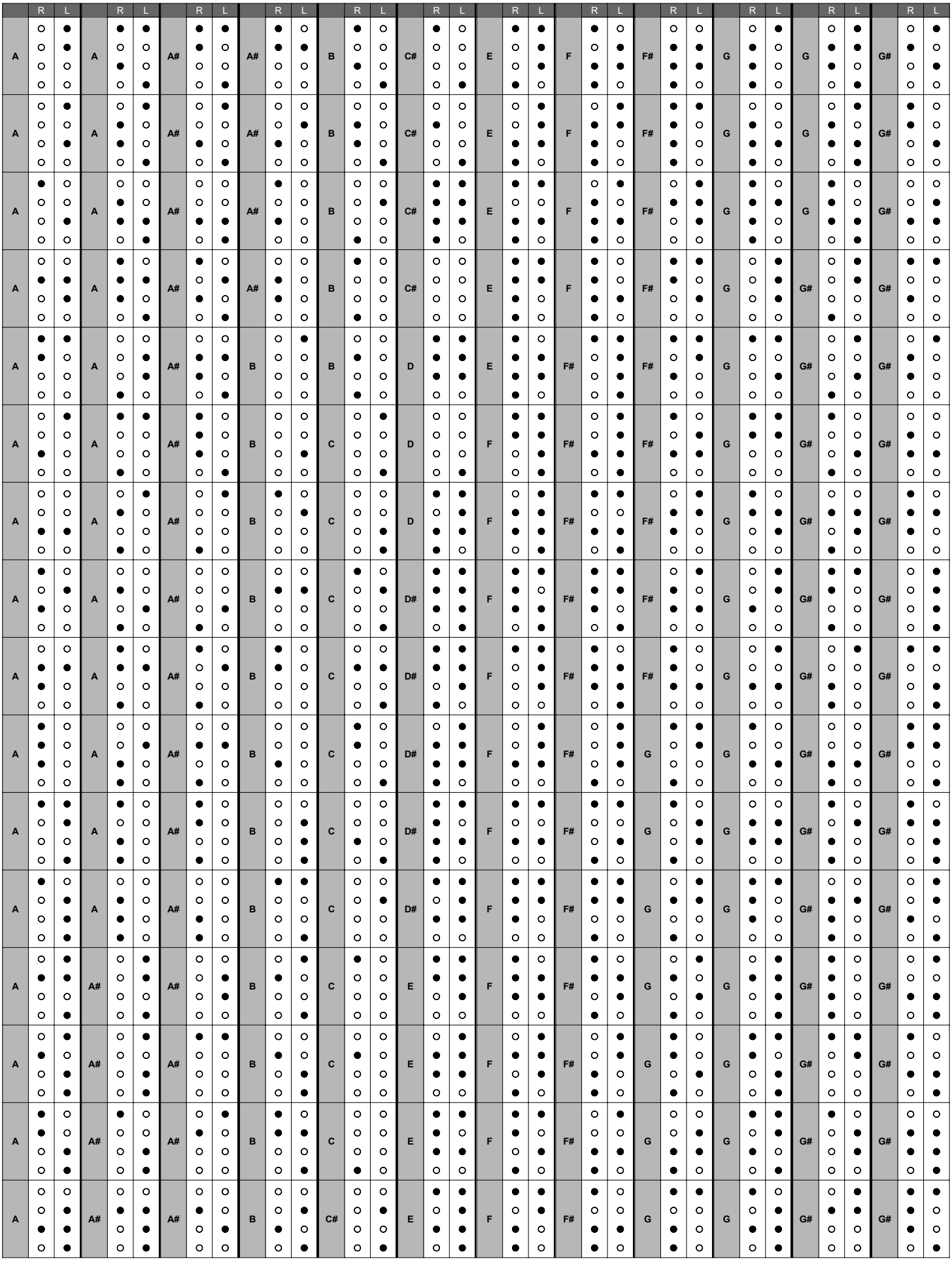
Key delay: While holding [PATCH SELECT] press the [OCTAVE DOWN] key. Turn [CONTROL KNOB 1] fully counter-clockwise. Play the ZWI and adjust [CONTROL KNOB 1] to a spot where you will not accidentally trigger passing notes when changing multiple keys, and there is an acceptable amount of latency. This is most noticable when passing through octaves. (Eg: passing from D down to C, or C up to D.)

// FINGER CHART //

	RIGHT HAND	LEFT HAND
C#	○	○
	○	○
	○	○
	○	○
A#	●	●
	○	○
	○	○
	○	○
G	○	●
	○	●
	○	●
	○	○
E	●	●
	●	●
	○	●
	○	○

	RIGHT HAND	LEFT HAND
C	○	○
	○	●
	○	○
	○	○
A	○	●
	○	●
	○	○
	○	○
F#	○	●
	●	●
	○	●
	○	○
D#	●	●
	○	●
	●	●
	○	○

	RIGHT HAND	LEFT HAND
B	○	●
	○	○
	○	○
	○	○
G#	●	●
	○	●
	○	○
	○	○
F	●	●
	○	●
	○	●
	○	○
D	●	●
	●	●
	●	●
	○	○


R L
A A A# A# B C# E F F# G G G#
A A A# A# B C# E F F# G G G#
A A A# A# B C# E F F# G G G#
A A A# A# B C# E F F# G G# G#
A A A# B B D E F# F# G G# G#
A A A# B C D F F# F# G G# G#
A A A# B C D F F# F# G G# G#
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A A A# B C D# F F# F# G G# G#
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