

VoiceWorks

Harmony | Correction | Effects



USER'S MANUAL

IMPORTANT SAFETY INSTRUCTIONS



The lightning flash with an arrowhead symbol within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

- 1 Read these instructions.
- 2 Keep these instructions.
- 3 Heed all warnings.
- 4 Follow all instructions.
- 5 Do not use this apparatus near water.
- 6 Clean only with dry cloth.
- 7 Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- 8 Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- 9 Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- 10 Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- 11 Only use attachments/accessories specified by the manufacturer.
- 12 Unplug this apparatus during lightning storms or when unused for long periods of time.
- 13 Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

Warning!

- To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.
- This apparatus must be earthed.
- Use a three wire grounding type line cord like the one supplied with the product.
- Be advised that different operating voltages require the use of different types of line cord and attachment plugs.
- Check the voltage in your area and use the correct type. See table below:

Voltage	Line plug according to standard
110-125V	UL817 and CSA C22.2 no 42.
220-230V	CEE 7 page VII, SR section 107-2-D1/IEC 83 page C4.
240V	BS 1363 of 1984. Specification for 13A fused plugs and switched and unswitched socket outlets.

- This equipment should be installed near the socket outlet and disconnection of the device should be easily accessible.
- Do not install in a confined space.
- Do not open the unit - risk of electric shock inside.

Caution:

You are cautioned that any change or modifications not expressly approved in this manual could void your authority to operate this equipment.

Service

- There are no user-serviceable parts inside.
- All service must be performed by qualified personnel.

IMPORTANT SAFETY INSTRUCTIONS

EMC / EMI.

This equipment has been tested and found to comply with the limits for a Class B Digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in residential installations. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on. The user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

For the customers in Canada:

This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Certificate Of Conformity

TC Electronic A/S, Sindalsvej 34, 8240 Risskov, Denmark, hereby declares on own responsibility that following products:

VoiceWorks - Harmony, Correction and Effects Processor

- that is covered by this certificate and marked with CE-label conforms with following standards:

- | | |
|----------------------|---|
| EN 60065 (IEC 60065) | Safety requirements for mains operated electronic and related apparatus for household and similar general use |
| EN 55103-1 | Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1: Emission. |
| EN 55103-2 | Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 2: Immunity. |

With reference to regulations in following directives:
73/23/EEC, 89/336/EEC

Issued in Risskov, 01 - 2003
Mads Peter Lübeck
Chief Executive Officer

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TEXT CONVENTIONS

Names of front panel controls, and keys are written in **CAPITALS**. Parameter names are in **SMALL CAPITALS**. Parameter values are in underline. Special notes appear in *italic*.

INTRODUCTION

Thank you for purchasing the TC-Helicon VoiceWorks Harmony, Pitch Correction and Effects processor. Designed for live and recording situations where superior vocals are a must, this state-of-the-art product creates the world's most natural sounding harmonies while offering innovative processing for the lead voice as well. VoiceWorks is an end-to-end solution. The signal path includes a studio-quality mic pre-amp, transparent pitch correction, superior manual and automatic pitch-shifting, as well as critically-acclaimed TC Electronic Compression/Gate, EQ, Delay and Reverb. We hope you will enjoy using the VoiceWorks as much as we enjoyed designing it.

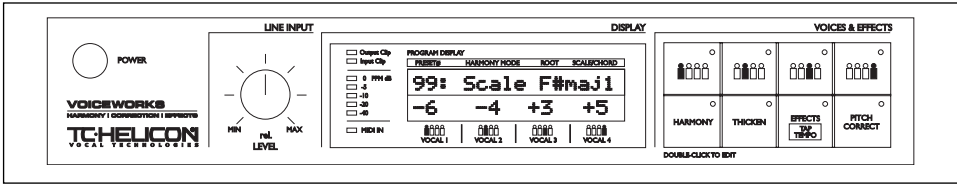
Features:

- HybridShift™ harmony generation for smooth, natural sound
- 4 distinct harmony Modes: Scalic, Chordal, Shift and MIDI Notes
- Humanization of harmony voices utilizing:
 - FlexTime™
 - Vibrato
 - Inflection - (scoop)
 - Pitch randomization
 - Portamento
- Equal temperament and Just tuning for harmonies
- Harmony Hold™- like a vocal sustain pedal
- Scale Based Pitch Correction
- Fully adjustable voicing and gender per voice
- Lead Voice Thickening - one voice above and one voice below
- High Quality Mic Preamp with 48V phantom power
- TC Electronic 3-band EQ plus low cut
- TC Electronic Compressor/Gate
- TC Electronic Reverb/Tap-tempo Delay
- Song Mode for live performance lets you save internal 'sequences'- up to 50 songs with 30 presets per song
- MIDI CC control over all parameters
- MIDI CC 'echo' of all front-panel controls

Please refer to this manual often, as there are many features and variations to explore. Our website is another good source for applications, support and other user services. Enjoy!

The TC-Helicon Team
www.tc-helicon.com

FRONT PANEL



POWER KEY

On/Off switch for the unit.

Note: In order for SETUP and current preset parameters to be saved, the unit must be powered off using this switch. Powering down by removing AC power will result in the loss of changes to these parameters.

LINE INPUT LEVEL KNOB

Adjusts the Line Input level. Range: 24dB

INPUT METER

Peak meter shows Input level. The Meter range is: 0 to -40dB.

INPUT CLIP LED

Indicates that the input level is too high possibly causing digital distortion. Reduce the input level to correct this condition.

OUTPUT CLIP LED

Indicates an internal DSP overflow. Reduce the overall level of the harmony voices and vocal effects to correct this condition.

MIDI IN LED

Indicates valid incoming MIDI information.

LCD TEXT DISPLAY

Displays top-level preset information (**presets recall mode**), detailed preset information (**edit menus**), system configuration (**setup menu**), song data (**song mode**), and any important status messages or user alerts.

VOICES AND EFFECT KEYS (GENERAL INFORMATION)

A VoiceWorks preset is made up of eight audio processing components represented by the eight VOICES & EFFECTS keys. Each key has an LED that is lit when its component is enabled in the current preset. A single click will toggle (enable or disable) the corresponding component. Double clicking on a key will enter its **edit menu**.

VOICES AND EFFECT KEYS (SPECIFICS)

VOICE KEYS (1-4)

On/Off/Edit functions for each harmony voice. Edit per-voice harmony parameters.

HARMONY KEY

On/Off/Edit functions for overall preset harmony settings. Edit parameters that affect all four harmony voices.

THICKEN KEY

On/Off/Edit functions for lead voice thickening.

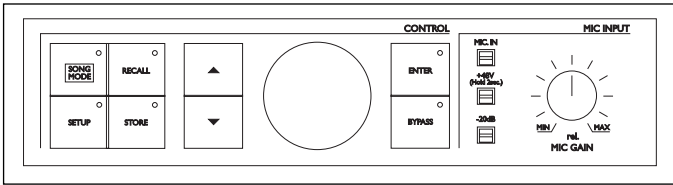
EFFECTS/TAP TEMPO KEY

On/Off/Edit/Tap functions for Reverb and Delay. **Tap Tempo** is available when editing specific delay parameters from the effects **edit menu**.

PITCH CORRECT KEY

On/Off/Edit functions for pitch correction.

FRONT PANEL



SONG MODE KEY

Press to enter **song mode**. Step through sequenced presets during live performance (using a footswitch or MIDI controller).

SETUP KEY

Press to enter the **setup menu**. Setup contains all global parameters not stored in individual presets including parameters relating to EQ, Comp/Gate, Audio, digital I/O, MIDI, and footswitch configuration.

Pressing this key repeatedly will advance to the first parameter in the next logical group of parameters. Use the ARROW KEYS to access each individual parameter.

RECALL KEY

Press RECALL from any **menu (edit or setup)**, or from **song or store mode** to return to top-level preset **recall mode**. Press RECALL from **recall mode** to recall a preset (overwriting the current preset) when the current preset has been edited or when previewing a different preset.

STORE

Press STORE to enter **store mode**. Pressing store when in **store mode** will store the

current preset to the displayed location. The STORE key LED blinks when the current preset has been edited.

ARROW KEYS

These buttons are used to navigate through parameters from the **edit menus**, the **setup menu**, **song mode**, or **store mode**.

Press and hold to quickly navigate through menus.

In **recall mode**, pressing up or down will instantly recall the next or previous preset.

DATA WHEEL

Edits the value of the current parameter from any menu or mode.

In **recall mode**, turning the wheel previews presets (top level preset information is flashed on the display but preset data is not loaded until RECALL is pressed again).

ENTER

Can be used to recall the current preset in **recall mode**, or to store the current preset in **store mode**. Parameters surrounded by triangular brackets (eg. Midi Dump <P25>) perform their actions when the ENTER key is pressed. The enter key blinks to indicate a possible action.

BYPASS

Press to toggle (bypass / unbyypass) all effects.

MIC INPUT

Press to select Mic input for processing (the line input becomes an AUX input when the MIC input is enabled)

+48V

Press **and hold for 2 seconds** to enable +48V phantom power on the microphone input.

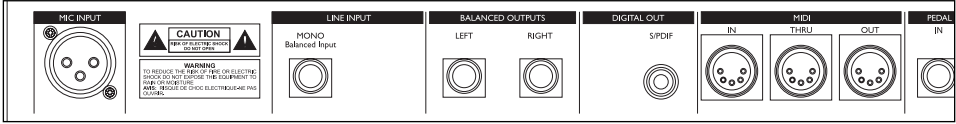
-20dB

Press to enable a -20dB pad on the microphone input. If the Mic Sensitivity (MicSENS) under the **setup menu** is set to high, pressing this button will change the sensitivity to normal and enable the -20dB pad.

MIC GAIN

Adjusts Mic Input Gain. Range: 35dB. This in combination with the -20dB pad and the MicSENS parameter under the **setup menu** provides 65dB range of gain to accommodate most microphones in most recording situations.

REAR PANEL



Balanced Mic Input with +48V Phantom Power

Balanced Jack Analog Input

Balanced Jack Analog Outputs

Digital S/PDIF Input/Output

MIDI In, Out, Thru

External Control

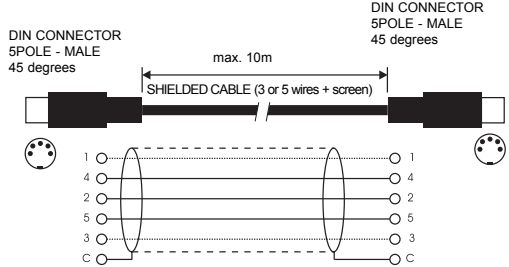
Note!

The microphone input on the VoiceWorks has +48V phantom power capability. **Never plug single ended (unbalanced) microphones or instruments or signal processors (balanced or unbalanced) into the mic input if +48V phantom power is on.**

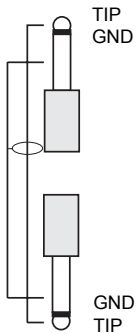
The 1/4" analog Input and Output connectors on the VoiceWorks are balanced 1/4" jacks.

Optimal connection to balanced equipment is achieved using balanced cables. However, if your equipment is NOT balanced you will generally have no problems using standard mono-to-mono cables as illustrated below.

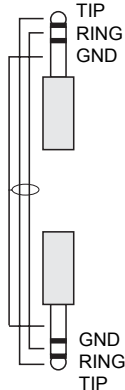
MIDI Cable



Mono 1/4" Cable

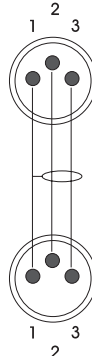


TRS (Tip Ring Sleeve) 1/4" balanced Cable



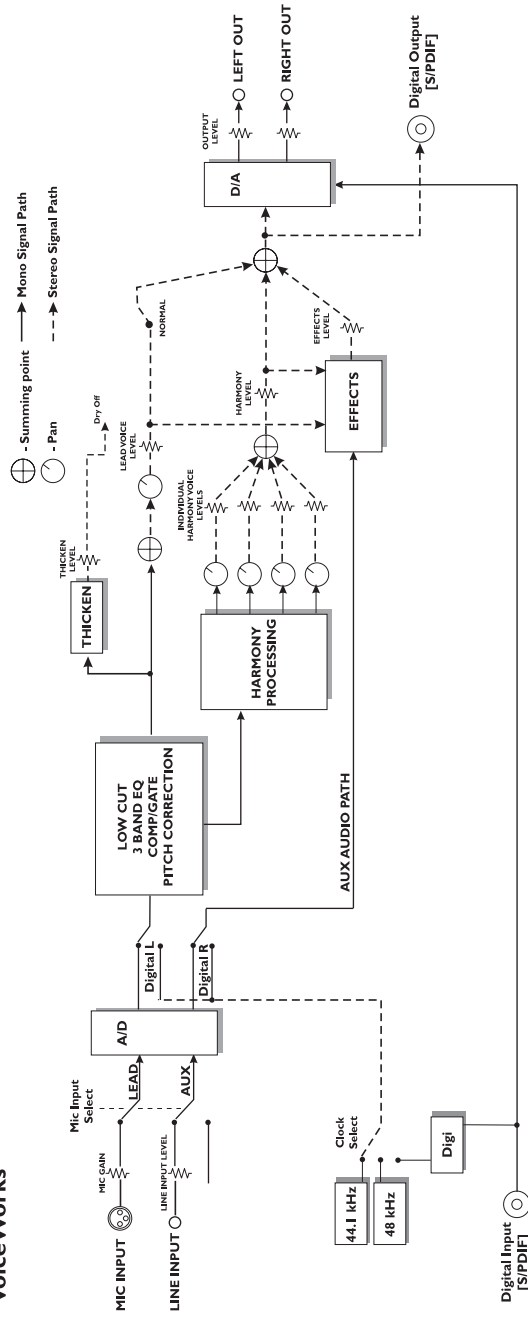
Balanced XLR Cable - 3 Pin Type

Pin 1 = Ground
Pin 2 = Hot
Pin 3 = Cold



SIGNAL FLOW

VoiceWorks

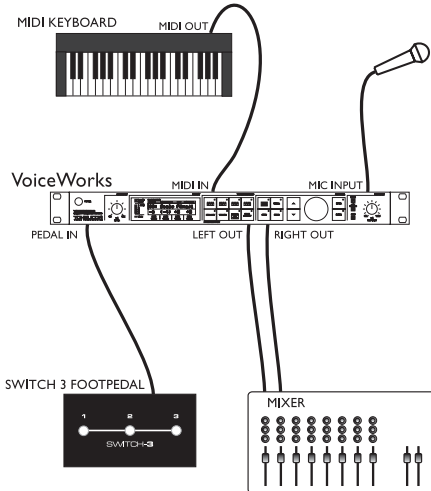


Notes: When LEAD LEVEL is set to Dry Off the LEAD VOICE LEVEL defaults to 0dB (maximum)

APPLICATIONS

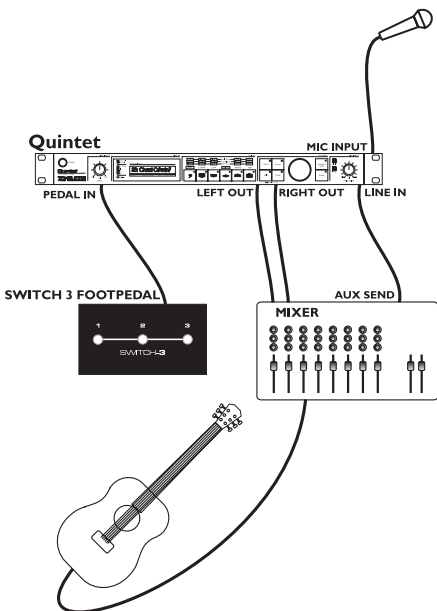
Live Setups

Using the VoiceWorks live is like bringing 4 professional backup singers to your gig! You've got several options when it comes to controlling the VoiceWorks Live. For best results you can use (in various combinations) the Switch-3 footpedal, a MIDI keyboard, a MIDI CC controller, and of course the controls on the box itself. We've provided setup examples below for a few common situations.



Live Setup with a MIDI Keyboard

- Connect a microphone to the XLR mic input on the VoiceWorks and enable MIC input from the front panel.
- Connect the keyboard MIDI Output to the VoiceWorks MIDI input.
- Plug the Switch-3 footpedal into the VoiceWorks Pedal In jack. This allows foot control of the Harmony Hold feature as well as various other VoiceWorks functions. *See the FOOTSWITCH parameter description in the "Setup" section of the manual for details.*
- Connect the VoiceWorks stereo outputs to a stereo channel (or two mono channels) on your mixer. **For mono operation** use the either of the VoiceWorks outputs and set the unit to mono operation with the OUTPUT parameter under the **setup menu**.



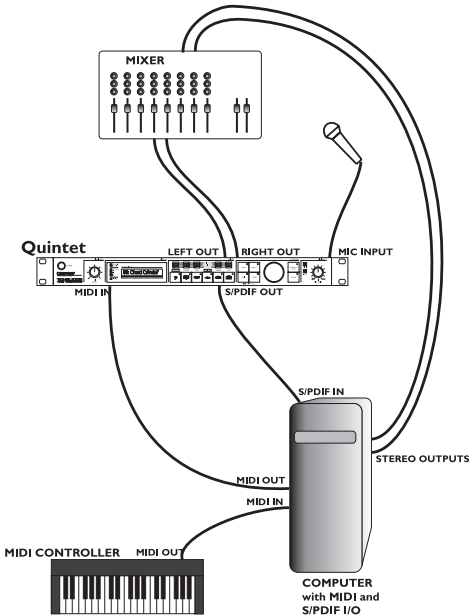
Live Setup with Guitar

- Connect a microphone to the XLR mic input on the VoiceWorks and enable MIC input from the front panel.
- Plug the Switch-3 footpedal into the VoiceWorks Pedal In jack. Using **song mode** you can create sequences of presets to handle chord changes and then step through them with the footpedal.
- Connect a guitar to your mixer and enable its effect send.
- Take an effects send from your mixer and connect it to the VoiceWorks Line input (it acts as the Aux input when the MIC input is enabled). Anything connected to the Line input in this mode can be mixed through the VoiceWorks' Reverb and Delay effects.
- Connect the VoiceWorks stereo output to a stereo channel (or two mono channels) on your mixer. **For mono operation** use the either of the VoiceWorks outputs and set the unit to mono operation with the OUTPUT parameter under the **setup menu**.

APPLICATIONS

Computer Based Digital Studio Setup

The VoiceWorks' pristine -128dB EIN (Equivalent Input Noise) mic preamp and 24 bit A/D conversion alone justifies its place in your Studio rack. The industry's best sounding pitch correction and the ability to create harmony vocals with quality good enough to solo in a mix make this unit a must-have for anyone working with Vocals. We've put together an example setup below for a basic digital studio setup.



Digital Studio Setup

- Connect a microphone to the XLR mic input on the VoiceWorks.
- Connect the S/PDIF out from your computer to the S/PDIF in on the VoiceWorks and the S/PDIF out from VoiceWorks to the S/PDIF in on your computer.
- If you're recording/sequencing software has the capability to echo incoming MIDI to MIDI out (most do), connect the MIDI out of your controller Keyboard to the MIDI in on your computer and configure it to pass the Keyboard's MIDI messages through to the VoiceWorks.
- Connect the MIDI out from the computer to the MIDI in on the VoiceWorks.
- If your computer has multiple MIDI inputs, connect the MIDI out from the VoiceWorks to the extra MIDI in. The VoiceWorks outputs MIDI when parameters are being changed so that during a recording session it is possible to record parameter changes that you make from the VoiceWorks into your sequences. The parameter changes can then be adjusted to perfection in your sequencer program!
- Connect the right and left outputs of the VoiceWorks to your mixer and monitor in real time what the VoiceWorks is doing without dealing with the time delay associated with routing the signal in and out of the computer.
- Connect the computer stereo audio outputs to your mixer.

PRESET HANDLING

Parameter types

The VoiceWorks has over 100 useful parameters and a user interface that lets you view and edit efficiently. Some parameters are *preset* based and some are *setup* based.

Preset parameters are all the parameters found under the eight **Voices & Effects** keys. Each preset has its own set of these parameters.

Setup parameters are global and do not change when a different preset is recalled. Setup parameters are all the parameters found under the **setup menu** including Lead input level and pan, Compression/Gate, and EQ parameters among many others. If you change your microphone (or singer!) the EQ/Compression settings need to only be adjusted once in the **setup menu**. If you wish to backup your setup settings, the VoiceWorks is able to MIDI dump setup parameters to sysex for later retrieval.

Preset Types

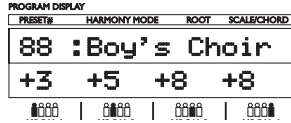
It's important to understand the concept of the **current preset** versus **stored presets**.

The current preset is the preset that is always active in the VoiceWorks. Recalling a preset copies preset data from one of the 100 stored presets into the current preset. As you change the current preset, the underlying stored presets are not affected until you choose to store the current preset back to a stored preset.

When dumping and receiving presets via MIDI, data is dumped from and received to stored presets. The current preset remains untouched. For example, if you are looking at preset 5 and receive a SYSEX preset to preset 5, it will seem as if nothing has changed. The preset you are looking at is still the current preset. Press **RECALL** to copy the new data from the stored preset 5 to the current preset.

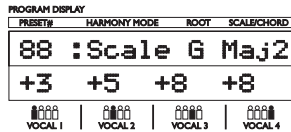
It is possible to directly receive and dump from the current preset. Refer to the SYSEX MIDI documentation available on our website.

When presets are recalled or previewed, the first line of the LCD display shows the preset name and the second line displays the harmony voicings.



See the *INDIVIDUAL VOICE KEYS* description for more on Harmony Voicing.

After a few seconds the first line changes to display the harmony mode, the root/scale/chord information, or when in Harmony Notes Mode, the currently detected notes coming from MIDI.



All presets may be restored to their factory default from the **setup menu**.

Global Effect Presets

If you select a preset for the **GLOBAL EFF** parameter in the **setup menu**, its effect settings will be used regardless of the current preset effect settings.

If you store the current preset while a Global Effect is active, the current preset data will be stored to the selected preset number, but any changes to the effect data (which come from the Global preset) will be stored to the global preset.

RECALL

Recalling a preset means loading/activating a stored preset. The stored preset data is copied into the current preset.

- Press **RECALL** to enter **recall mode**.
- Use the **DATA WHEEL** to preview presets. Blinking preset names/information indicates a previewed preset. Previewing means that you have not actually loaded the preset.
- Press **ENTER** or **RECALL** to recall/activate the currently previewed preset. This transfers the stored preset to the current preset.

PRESET HANDLING

Press any other key at any time during previewing to return to the currently recalled preset.

All 100 presets shipped with the VoiceWorks can be modified or overwritten. You can always restore a preset to its factory default from the **setup menu**.

Edit

To edit preset parameters:

- Double click any one of the **Voices & Effects** keys.
- Tab through the menu of parameters using the ARROW KEYS. A flashing cursor will appear over the data that you can edit using the DATA WHEEL.

STORE

To store a preset:

- Press STORE.
- You can store to the current location, or you can select a different location using the DATA WHEEL.
- If you want to change the preset name, use the ARROW KEYS to step through each character of the name and use the DATA WHEEL to edit each character.
- When you are ready, press STORE again to store the preset to the chosen location and name.

Presets Backup via MIDI

The VoiceWorks allows MIDI dumping of all or individual presets, all or individual songs and the VoiceWorks setup parameters.

- Connect the VoiceWorks MIDI Out to MIDI In on either another VoiceWorks or an external MIDI device.
- Enter the **setup menu** by pressing the SETUP key and scroll to the MIDIDump parameter.
- Select what you would like to backup using the DATA wheel. Pn indicates a preset; Sm indicates a song, and Setup indicates all setup parameters.
- If connected to another VoiceWorks simply press ENTER and your data will be copied to the other VoiceWorks.

- If connected to a sequencer, arm it to record SYSEX data and press ENTER on the VoiceWorks.

The VoiceWorks is always ready to receive MIDI System Exclusive Dumps.

Simply connect MIDI Out from the device you are dumping from to the MIDI In on the VoiceWorks and send the Sysex dump at any time.

VOICES & EFFECTS EDIT PARAMETERS

Introduction

A VoiceWorks Preset is made up of all parameters under the eight **Voices & Effects** keys.

These include INDIVIDUAL VOICES (4), overall HARMONY, lead voice THICKENING, EFFECTS, and PITCH CORRECTION keys.

A **single click** on a **Voices & Effects** key will activate/deactivate its processing, a **Double click** will enter its **edit menu**. Lit key LEDs indicate that the respective processing is enabled.

INDIVIDUAL VOICE KEYS

These are the keys with the four human body icons. They allow the enabling/disabling/editing of individual harmony voices.

A **single click** will turn on/off an individual harmony voice. **Double clicking** a key gives access to the following parameters:

LEVEL

Sets the output level of the selected voice.

Please note that there is also a master harmony voice level found under the HARMONY key.

VOICING

This parameter is used to set the voicing of the selected voice. This parameter means different things depending on the harmony mode of the preset.

Scale Mode Presets

In this mode the Voicing parameter specifies the interval of the harmony note with respect to the input note in the scale. The range of values goes from -8, which is 2 octaves below the input note, to +8 which is two octaves above the input note, or Cus, which means custom voicing (See MAP description). For example, a setting of +3 will result in a harmony voice a third above the input voice, related to the current scale.

Chord Mode Presets

In this mode the Voicing parameter specifies the relation of the harmony note to the input note with respect to the current chord. In chord mode presets, the harmony voices are always notes in the chord. A setting of Up1 will result in the harmony voice being the next note above the input voice in the chord. For instance if the Chord was C Major and the input note was an E, an Up1 setting would produce a G harmony voice, just above the input

E. The range of values goes from Dn5 (Down 5) to U (unison) to Up6. Additional values are Rt1 and Rt2 which give the root as the harmony voice, and Bs1 and Bs2 (bass voicing) which give the lowest MIDI note received. Rt2 and Bs2 are the higher pitch root and Bass settings.

Shift Mode Presets

In this mode the voices are shifted relative to the input note. The values range from -24 semitones to +24 semitones.

Notes Mode Presets

In this mode there is no selectable voicing, instead you will see the currently decoded MIDI note for the selected voice.

GENDER

This parameter sets the formant of the Harmony Voice. Use it to alter the character of the voice ranging from -50 (a big person with a deep voice) to 0 (no change) to +50 (mice/alien sound).

VIB

Vibrato Style. A list of Vibrato styles based on the analysis of real singers.

VIB AMT

Vibrato amount. The depth of vibrato applied to the voice.

PAN

L100 (panned fully left) to R100 (panned fully right)

MAP

Custom Voice Mapping (Scale Mode Only). Scale mode harmonies are basically pitch maps. For each input note in a scale you can define a resulting harmony note. The VoiceWorks has pre-defined pitch maps for all the offered scale roots, types, and intervals. The Custom voicing feature allows you to create your own pitch maps. For example, you could define a pitch map so that a C input produces an E output and a D input produces an A output. The best way to work with custom voicing is as follows:

- For a given harmony voice, select the scale root, type, and interval that most closely matches the desired voicing.
- Go to the **MAP IN** parameter and select the input note that requires a different harmony note.
- Go to the **OUT** parameter and change the

VOICES & EFFECTS EDIT PARAMETERS

harmony note as desired.

- Select various other input notes and remap as desired. Repeat the above steps for each harmony voice.
- The custom map can be transposed under the Harmony Edit page by changing the **SCALE ROOT**.

HARMONY KEY

This key allows the enabling/disabling/editing of the harmony parameters that affect all 4 harmony voices.

A **single click** will turn on/off the all harmony voices. **Double clicking** gives access to the following parameters:

HARMONY MODE

Change the current harmony mode. Available parameters: Scale (Scalic presets), Chord (Chordal presets), Shift, and Notes (Shift and Notes presets).

See the “*Harmony, and Tuning*” section of the manual for a full description of each harmony mode.

ROOT

In Scalic presets this sets the scale root. In Chordal presets sets the chord root.

SCALE/CHORD

In Scalic presets this sets the scale type. In Chordal presets this sets the chord type. (The Chord will change if incoming MIDI notes are detected as representing Valid chords).

LEVEL

Sets the overall harmony voice level.

SMOOTH

Sets how much of the input pitch nuance is applied to the output voice. Not applicable to Shift presets.

LEAD

This allows turning the lead voice On or Off, independent of the Lead Level parameter in the **setup menu**. This is useful in creating presets where you want to hear harmony voices only.

STYL

Humanization style. This is a list of humanization style types, each made up of a combination of Flextime™ based time randomization, pitch randomization and pitch inflection (scoop).

STYL AMT

The amount that the humanization style is applied to the harmony voices.

BEND

Pitch Bend Wheel assignment. Allows assignment of the pitch bend wheel to Pitch (applicable in Notes and Chord harmony modes) or Gender.

PORTA

Portamento. This is defined in milliseconds as the time to reach a target note when a harmony voice needs to change pitch.

LATCH

When enabled in chordal mode, the last chord played remains active after the notes have been released from the MIDI keyboard. When enabled in Notes mode, the harmony voices will only respond to MIDI note input when the number of notes being played equals the harmony voices enabled. This ensures logical voice assignment when voices change.

When Latch is On, the envelope parameters Attack and Release are not applicable.

ATK

Sets the envelope attack time for harmony voices. Available in Notes and Chords mode.

REL

Sets the envelope release time for harmony voices. Available in Notes and Chords mode.

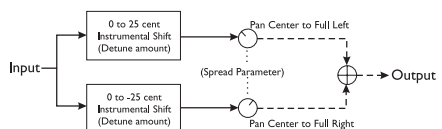
TUNING

This gives the option of either Equal temperament, Just intonation, or Barbershop tuning modes. See the “*Harmony, and Tuning*” section of the manual for a full description of each tuning mode.

THICKEN KEY (Lead Voice)

This key allows enabling/disabling/editing of lead voice thickening parameters.

Thickening Block Diagram



VOICES & EFFECTS EDIT PARAMETERS

LEV

Sets the volume level of the lead voice thickening effect.

DET

Sets the amount of lead voice detuning.

SPRD

Sets the amount that the detuned voices are panned. A value of 100% results in the detuned voices being hard panned R and L. A value of 0% results in the detuned voices panned to center.

EFFECTS Tap tempo KEY

This key allows the enabling/disabling/editing of the effect parameters and can be used to tap the tempo of the delay time.

A **single click** will turn on/off the Reverb/Delay effects. **Double clicking** gives access to parameters related to the Reverb and Delay effects. Once in this **edit menu**, **double clicking** will advance to the next logical group of parameters. Pressing **ARROW KEYS** will move to the next or previous parameter, and holding down arrows will quickly scroll through the parameters.

FX LEVEL

Sets the overall volume of the combined Reverb and Delay effects.

REV/DLY

Reverb/Delay mix.

LE-REV SND

Lead to Reverb effects send.

HA-REV SND

Harmony to Reverb effects send.

AU-REV SND

Auxiliary to Reverb effects send.

LE-DLY SND

Lead to Delay effects send.

HA-DLY SND

Harmony to Delay effects send.

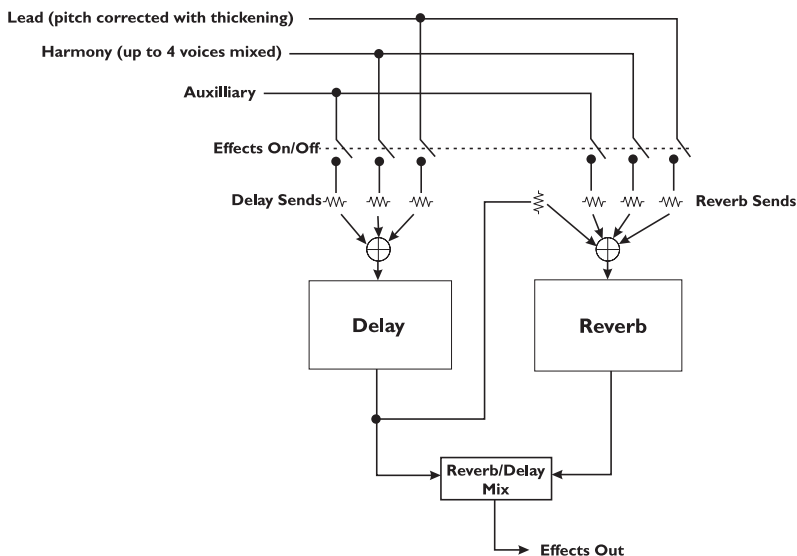
AU-DLY SND

Auxiliary to Delay effects send.

DLY2REV SND

Delay output to Reverb effects send.

Effects Block Diagram



VOICES & EFFECTS EDIT PARAMETERS

REVERB TYPE

The list of reverb types includes the following acoustic simulations:

Living Room, Chamber, Club, Classic Hall, Concert Hall, Large Cathedral, Vocal Studio, Vocal Room, Vocal Hall, Ambience, Live Reverb, Plate1, Plate2, and Spring.

REVPREDLYT

Reverb Pre-delay time. Sets the delay time prior to the reverb output. Large rooms typically have reverbs that start much later than the initial signal.

DECAY

Reverb Decay Time.

L

Reverb Low Color. Specifies the characteristics of the reverbs low frequencies.

H

Reverb High Color. Specifies the characteristics of the reverbs high frequencies.

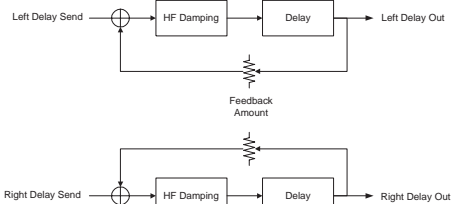
DELAY TYPE

DualMono Delay- maintains the panning of the sends.

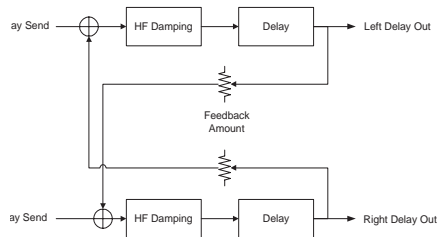
PingPong1 sends the lead voice to the left effect end only.

PingPong2 sends the lead voice to the sends depending on the lead pan setting.

Dual Mono Delay



PingPong1 and PingPong2 Delay



DLY (ms)

Using the DATA WHEEL, you can fine adjust the current delay time.

DELAY TEMPO SOURCE

TAP: the DLY time comes from the last tapped tempo.

MCLK: the Dly time comes from incoming MIDI clock messages.

IGNORE: the Dly time always comes from the value manually entered into preset using the DATA WHEEL.

DELAY TEMPO RATIO

Sets the ratio between the Tapped or MIDI tempo and the resulting delay.

With TAP selected as a tempo source, the tempo may be tapped in when any of the three above parameters are selected.

FB

Delay feedback amount.

D

High Frequency Damping.

VOICES & EFFECTS EDIT PARAMETERS

PITCH CORRECT KEY

This key allows the enabling/disabling/editing of the pitch correction parameters.

The VoiceWorks will listen to the pitch of your voice, compare it to the selected correction scale, and then apply pitch correction in real-time. The amount of correction applied is governed by the various amount and timing settings available.

Pitch correcting your lead voice not only makes for great sounding lead vocals, it can also benefit your harmonies in that the pitch correction is applied prior to harmony voice generation.

A **single click** will enable/disable pitch correction. **Double clicking** gives access to the following parameters:

ROOT

Pitch Correction scale root.

SCALE TYPE

Pitch Correction scale type. Maj (Major), Min1 (natural minor), Min2 (harmonic minor), Min3 (ascending melodic minor), Chro (Chromatic) and Custom. This setting in combination with scale root determines which notes your input vocal will be corrected to.

WN

Correction Window. Specifies the maximum distance (above or below) in cents an out-of-tune note can be from the closest correction note and still be corrected. A very small window setting will cause correction to occur only when the singer is singing very close to the correct pitch. The maximum window size is 200 cents or a whole tone above and below the target pitch.

At

Pitch Correction attack rate. Sets the responsiveness of the correction. 0% is slow, and 100% is fast. Settings of between 16% and 40% give the most transparent pitch correction. High settings can give you a robotic sounding effect.

AM

Pitch Correction Amount. Scales the amount of automatic correction applied to the input voice. The range is 0% to 100%. However, 0% does not mean that the correction is turned off. The amount of applied correction depends on how far out of tune the input note is.

This allows for a very musical way of correcting pitch. It corrects the large pitch errors while preserving the natural micro variations around the target pitch. For example:

With the amount set to 100%, a 10 cent flat input will be corrected by 10 cents and a 50 cent flat input will be corrected by 50 cents.

With the amount set to 80%, a 10 cent flat input will be corrected by approximately 5 cents and a 50 cent flat input will be corrected by approximately 40 cents.

With the amount set to 0%, a 10 cent flat input will not be corrected and a 50 cent flat input will be corrected by approximately 10 cents.

The line below the WN, At and AM parameters graphically shows in real-time the pitch correction that is being applied by the VoiceWorks. The maximum correction displayed is +/- 200 Cents.

PITCH CORRECTION SCALE MAP

This page indicates the actual notes of the of current correction scale (Maj, Min1, Min2, Min3, Chrom or Cust). It provides a chromatic list of notes beginning with the scale root. Below this list a series of "o"s and "x"s indicating which notes are in the pitch correct scale and which are ignored. "o" indicates that the note is in the scale and "x" indicates that the note is ignored. The scale may be modified by moving the cursor to an "x" or "o" and turning the DATA WHEEL to change its state. Modified (custom) scales are stored with presets.

SETUP PARAMETERS

Introduction

Parameters in the **setup menu** are global and are not stored within the preset. They are parameters that would typically be set for a given situation based on the singer, microphone or studio configuration and then left that way as a basis for the presets within the VoiceWorks. Setup parameters can be backed up via MIDI sysex dumps. (see the “Preset Handling” section of the manual for details). Pressing the SETUP key gives access to:

Lead Voice Level and Pan

LEAD LEV

This parameter sets the Lead Voice Level. Range: Dryoff, Off, -30db - 0dB. The setting DryOff mutes the dry input vocal, but allows the thickening voices to pass through the unit as if the lead level was set to 0dB. See the “Signal Flow Diagram” for the location of the Dry Lead Mute.

LEAD PAN

Adjusts panning for the lead voice.

LOW CUT

Low cut filter. 12dB per octave. Cutoff frequency options include 60, 80 and 120 Hz.

Dynamics Processing

The VoiceWorks has dynamics processing optimized for vocals.

DYNAMICS

Compressor/Gate assignment. The options are: Off, Lead & Harmony, Harmony or Lead. The compressor has auto-makeup gain.

COMP THRESHOLD

Compressor Threshold. Range: 0 to -60 dB.

RATIO

Compression ratio. Range: 1.1:1 to 64:1

GATE

Gate Threshold. Range: Off, -70dB to 0dB

EQ

The VoiceWorks has an extremely flexible 3 band EQ with frequency adjustable high and low shelving bands as well as a fully parametric band with Q frequency and Gain controls.

EQ

EQ assignment. The options are: Off, Lead & Harmony, Harmony or Lead.

L

Low Shelving Frequency.--- Cut/boost

H

High Shelving Frequency.--- Cut/boost

M

Mid band Frequency.--- Cut/boost

Q

Resonance of the midband. Range is .1 (wide band) to 10 (very narrow band).

LEAD DELAY COMPENSATION

Turning this on delays the lead vocal so that the humanized harmony voices will be randomly ahead and behind the lead voice. Turning this off results in minimum lead voice processing delay.

BYP. MODE

Stage or Studio. Stage attenuates the signal in bypass to minimize a jump in level when changing from bypass to unbypass. Studio outputs the full level in bypass for the best audio quality possible.

MicSENS

High or Normal. High gives an additional 10db of gain. Normal mode should be used whenever possible for the best audio quality.

OUTLEV

This is like a multi-turn output level pot for the analog outputs. Range -80dBu to +20dBu. Please note that some mixers will produce a distorted signal with a +20dB signal. If you experience distortion and neither the input nor output clip lights are flashing on the VoiceWorks, try adjusting this parameter to a lower setting.

OUTPUT

Output Mode: Stereo or Mono.

SAMPLE RATE:

44.1kHz, 48kHz or External.

SETUP PARAMETERS

INPUT

Analog or Digital. Please note that selecting Digital input will automatically change the Sample Rate to external. The sample rate may at that point be adjusted back to what is desired.

GLOBAL EFF

Global Effects. The effect settings from the chosen preset become global for all recalled presets.

TUNING

Sets the tuning reference based on A-440.

MIDI Parameters

MIDI CHANNEL

Sets the base MIDI Send and Receive channel.

MIDI FILTER

VoiceWorks can be set to ignore MIDI data:

- Prg ignore program changes.
- SX ignore system exclusive messages.
- Prg+SX ignore program changes and system exclusive messages.

CC CTRL

Selects the active CC control Map (refer to the MIDI implementation section for details). Advanced is for full CC control, GM-Basic is for use with standard MIDI files and other generic MIDI arranger products.

GLOBAL CHORD

- On the last MIDI detected chord type and root is retained when switching through chordal presets.
- Off the chord type and root is always taken from the preset recalled.

SYSEX ID

This parameter sets the MIDI sysex ID for the VoiceWorks.

KEYBOARD ZONE

Sets the range of MIDI notes to be used for **notes** and **chordal** mode harmony generation. Incoming MIDI notes falling outside this range will be ignored.

Example:

Above C4- tells VoiceWorks to respond to notes above C4 only

VIB CONTROL

Vibrato Control sets whether vibrato follows the onset and attack of the model (Boost) or is instantaneous (Manual). The Mod Wheel on most keyboards controls the vibrato in both modes, boosting the preset value in the Boost setting and starting from a value of 0 in the Manual setting for full manual control.

NOTES TRANS

Notes Mode Transpose. This transposes the harmony voices in notes mode. The value corresponds to octaves. This is useful when used in conjunction with Keyboard Zone.

BEND RANGE

Sets in semitones the range that MIDI pitch bend information will alter the pitch of the harmonies in Notes mode.

NOTES4CHAN

4 Channel Notes Mode.

- Off: All harmony voices in Notes Mode will respond to the base MIDI channel.
- On: In Notes mode, Harmony Voice 1 responds to the base MIDI channel; Harmony Voice 2 responds to the base MIDI channel +1 etc. All Harmony Voices will respond to unique MIDI channels.

FOOTSWITCH 1-2-3

For fully functional footpedal control, use the TC-Helicon Switch-3 foot pedal (other 3 button footswitches may work also). Each button can be assigned to one of the following functions:

- None Ignore this button.
- SS+/- Increment/Decrement

Song Mode: inc/dec song step

Recall Mode: inc/dec current preset

Pressing increments (changes on release). Holding for 2 seconds starts decrementing.

- SS+ **Song Mode:** Increment Song Step
Recall Mode: Increment current preset.

- SS- **Song Mode:** Decrement Song Step
Recall Mode: Decrement current preset.

Byp Bypass

EffL Effect toggle mute - latched

EffM Effect toggle mute - momentary

SETUP PARAMETERS / SONG MODE

(effects are on only when the pedal is pressed)

HarL Harmony toggle mute

HarM Harmonies toggle mute - momentary (harmonies are on only when the pedal is pressed)

Hsus Harmony Hold.

MIDI DUMP

Allows SYSEX MIDI dumping of all or individual presets, all or individual songs, and the VoiceWorks setup data.

- Select what you would like to backup using the DATA WHEEL. Pn denotes a preset; Sn Denotes a song; Setup is all setup data.
- If connected to another VoiceWorks simply press ENTER and your data will be copied to the other VoiceWorks.
- If connected to a sequencer, arm it to record SYSEX data and press ENTER on the VoiceWorks.

ERASE SONG

- Select what song you would like to erase using the DATA WHEEL and press ENTER.

RESTORE

Restore a Preset to its Factory setting

- Select what preset you would like to restore using the DATA WHEEL.
- Press ENTER to restore the preset.

VIEW ANGLE

Adjusts the optimal viewing angle for the LCD.

SONG MODE

The **song mode** feature allows you to control your VoiceWorks with a footswitch. This is helpful if you do not use a MIDI sequencer during performances. You can pre-program a sequence of presets, scale, root, or chord changes, and step through them as needed.

You can also repeat a single preset over a series of song steps while changing only the musical information. I.e. the chord, root, and type parameters in chordal presets, and the key and scale parameters in scalic presets.

Song mode is best used with a three button footswitch. This will allow you to step forward and backward in the sequence as well as let you mute the harmonies or bypass the box or processing components when necessary.

Sng3 <STEP INS>		
S1	P--	----

The display above is an example of a blank song.

- SNG:n indicates the song number. There is a maximum of 50 songs in the VoiceWorks.
- <STEP INS>, <STEP DEL>, <NAME SONG>: Select the function that you need using the DATA WHEEL and then press ENTER to either insert a song step identical to the current one, delete the current song step or name the song.
- S:m indicates the song step number. There are a maximum 30 steps per song.
- P-- is the selected preset for the step. A preset number followed by an **s** indicates it is a Scalic preset while a **c** following the number indicates a Chordal preset.
- The remaining field displays the Scale Root/Type for Scalic presets, or the Chord Root/Type information for Chordal presets or SHIFT / NOTES to denote their respective preset types.

To Create a Song:

- Press the SONG MODE button and use the DATA WHEEL to select a blank song.
- Using the ARROW KEYS move the cursor to P-- and set the desired preset number for the first step.
- If the first preset you wish to use is a Scalic or chordal preset, set the desired Root and Chord/Scale type.
- You can now either go to the STEP:INS field to insert multiple occurrences of the same preset and then edit the musical information for each, or you can go to the S: step field and advance the step number to create a new blank step, allowing you to manually specify a different preset with different musical settings.
- Using the S: parameter you can go back through the steps to modify the musical information for each step as desired.

All changes are automatically saved as you make them. Use MIDI SYSEX to back up your songs.

You can then use your footswitch (or an external MIDI controller) to step through them during a live performance.

HARMONY AND TUNING

Harmony

Here's where we can go into a little more depth about harmonies. We've tried to keep it practical, focusing on what VoiceWorks can do for you.

Harmony Hold

Truly an innovation, the Harmony Hold feature lets you (on a whim) sustain the backing harmony voices while you continue to sing through them. On activation (press and hold an assigned footpedal button or use the Harmony Hold MIDI CC), you can freeze whatever the harmony voices are doing, and they will hold their notes (in a very natural way) until you let go (of the pedal button or by sending the proper CC value). See the *FOOTSWITCH* parameter description in the "Setup" section of the manual and the "MIDI Implementation" section of the manual for more information.

Harmony Modes

VoiceWorks has five different harmony modes, which give five unique methods of creating harmony. Once we get into describing the more complex harmony modes, we'll be showing you examples based on the C major scale. If you are unfamiliar with this scale we've shown C major here.



Notes Mode

In this Mode, you provide the VoiceWorks with specific MIDI note information to determine the pitch of the harmony voices. VoiceWorks has two "Manual/Notes" harmony modes, single and 4 channel. The VoiceWorks may be set to Notes 4 Channel mode through the **setup menu**. Notes 4 Channel mode allows you to send 4 channels of MIDI information, one for each individual harmony voice. This is the most direct and flexible way of creating harmonies, allowing you to weave complex melodies and counter harmonies irrespective of your lead vocal.

Shift Mode

Also known as "Fixed Interval", this takes the pitch of your lead voice and creates harmonies a set number of semitones away, based on

that pitch. The method of creating harmonies, using a fixed number of semitones relative to an input note or pitch, is called chromatic harmony, the theory of which we'll go into later. We consider this type of harmonizing to be non-intelligent because VoiceWorks is not set to any particular key or scale. These are pure, parallel harmonies. The most common shift harmony voices are the 5th (7 semitones) and octave (12 semitones), ranging from two octaves below the input to two octaves above the input pitch.

Below is The C Major scale, showing third above chromatic scale harmony, as used in VoiceWorks Shift Mode.



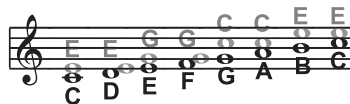
Black = Lead & Grey = Harmony

Chord (Chordal) Mode

Chordal harmonies take your chord information to create intelligent, diatonic harmonies based on your voice. To make "Chordal" harmonies, you need to input in real time the chords of the song. This may be done either via MIDI or through a programmed sequence of chord roots and types in **song mode**. Chord information consists of the chord root and type, which define the 3 or 4 notes in a given chord. In Chordal mode the VoiceWorks will only create harmony voices that fall on the notes of the chord. Chordal harmonies are "intelligent" because they decipher the chord you're playing and the note you're singing to produce musically pleasing harmonies. When 1 above is defined as a harmony voice (Up1), the next note from the chord above the input note is output for that harmony voice.

The subsequent illustration shows the harmony notes for the C major scale with a voicing selection of a C major chord and a single "one above".

Root: C, Chord Type: Maj, Voicing: Up1



Black = Lead & Grey = Harmony

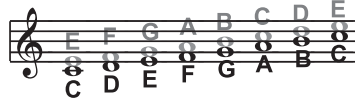
HARMONY AND TUNING

You might have noticed that each harmony note can cover more than one input note, or that each input note doesn't necessarily have a unique harmony note. For instance, C and D both have E as the 3rd above, E and F share G, and so on. This gives a more stepped sound to the harmony as the changes are both greater in magnitude and less frequent than when using other harmony methods (shift mode for example). The benefit of this method is that it is very easy to integrate vocal harmonies into your songs if you already know their chord progressions! The following lists the chords available with respect to the root of "C":

Maj	C	E	G	
Maj6	C	E	G	A
Maj7	C	E	G	B
Maj7sus4	C	F	G	B
Min	C	E \flat	G	
Min6	C	E \flat	G	A
Min7	C	E \flat	G	B \flat
Min7b5	C	E \flat	G \flat	B \flat
Dim	C	E \flat	G \flat	
Dim7	C	E \flat	G \flat	B $\flat\flat$ (equiv. to A)
Dom7	C	E	G	B \flat
Dom7b5	C	E	G \flat	B \flat
Aug	C	E	G \sharp	
Aug7	C	E	G \sharp	B \flat
Sus	C	F	G	
Sus2	C	D	G	
Sus7	C	F	G	B \flat

Scale (Scalic) mode

Harmonies use key and scale information to create musically correct, diatonic harmonies. Most popular music uses a single scale, so you usually only have to input the information at the beginning of your song. "Scalic" harmonies are more dynamic than the chordal harmonies because there are unique harmony notes for each input note. The subsequent illustration shows the harmony notes for the C major scale with a voicing selection of a C major scale and a single "third above" harmony voice. You can see from the next diagram that the "Scalic" harmonies are intelligent and closely follow your lead voice for a tighter sound.



Black = Lead & Grey = Harmony

Under the HARMONY Key, is a parameter called SMOOTHING. When set to 100% the harmony voices follow your input pitch, errors and all, but when set to 0% the harmonies will jump directly to the scalar harmony notes, kind of like a hard pitch correction on the harmony voice. Setting the SMOOTHING parameter between 0 and 100% is like having variable amounts of pitch correction on the harmonies. VoiceWorks has five preprogrammed harmony scales: three major, three minor and one custom per preset. To create a custom scale or pitch map see the **MAP** parameter description under the Individual Voice Key description in the manual.

It is also tricky to pick out the key in some songs. An example is "Sweet Home Alabama". Listening, you might think this song is in the key of "D", as that's the first chord, but the harmonies actually work best in the key of "G" -- try running the song through VoiceWorks to hear for yourself.

Setting the scale can also take a bit of practice: for songs centered around the third or root of the scale it might not sound like there's any noticeable differences between the three major or three minor scales. This is because your song doesn't hit any of the scale's altered notes. A melody centered around the fifth of the scale, (such as B in the key of E), highlights the differences between the scales. Try the "Sha Lala Lala ...La Tee Daa" chorus of Van Morrison's "Brown Eyed Girl" (key: E, scale: major, 3rd above voicing) with each major scale to hear the audible difference between them. For the minor scales, Santana's "Evil Ways" (key: G, scale: minor, 3rd above voicing) highlights the differences between the three minor scales.

The following table illustrates the third and fifth above for a given input note to illustrate the differences between the six different scales. "nc" means no change, in that the harmony voice will simply keep its previous pitch until the lead voice pitch changes to a non "nc" note. For complete voicing information see our website at www.tc-helicon.com

HARMONY AND TUNING

	Lead Voice	C	C#	D	Eb	E	F	F#	G	G#	A	Bb	B
MAJ1	3rd Above	E	nc	F	nc	G	A	nc	B	nc	C	D	D
	5th Above	G	nc	A	nc	B	A	nc	D	nc	E	F	F
MAJ2	3rd above	E	nc	F	nc	G	A	nc	C	nc	C	D	D
	5th above	G	nc	A	nc	C	C	nc	E	nc	E	F	F
MAJ3	3rd above	E	nc	F	nc	G	A	nc	Bb	nc	C	D	D
	5th above	G	nc	A	nc	Bb	C	nc	D	nc	E	F	F
MIN1	3rd above	Eb	nc	F	G	nc	Ab	nc	Bb	C	nc	D	nc
	5th above	G	nc	Eb	nc	C	C	nc	Eb	Eb	nc	F	nc
MIN2	3rd above	Eb	nc	F	G	nc	A	nc	Bb	C	nc	D	nc
	5th above	G	nc	A	Bb	nc	C	nc	D	Eb	nc	F	nc
MIN3	3rd above	Eb	nc	F	G	nc	Ab	nc	B	C	nc	D	nc
	5th above	G	nc	A	Bb	nc	C	nc	D	Eb	nc	F	nc

Diatonic and Chromatic

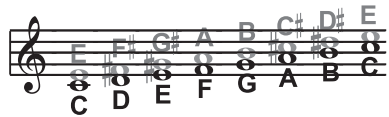
We've described scalic and chordal harmonies as diatonic, and shift harmonies as chromatic; but what do those words mean?

Look at a piano keyboard. Between middle "C" and the next "C" there are twelve keys - 7 white keys and 5 black keys. Each of those keys are pitched one semitone apart for a total of, you guessed it, 12 semitones. The chromatic scale uses all twelve semitone notes opposed to the diatonic scales. Thus there is only one chromatic scale, but 12 each of the major, minor, etc. diatonic scales (C major, C# major, D major, etc). Most of us have grown up hearing the traditional "doh ray me fah so la tee doh" diatonic scale, so that harmonies based on the diatonic scale sound correct. What does this mean, harmony-wise?

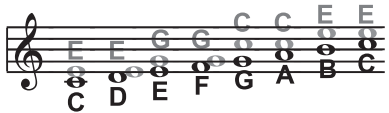
Diatonic scale harmonies can only use notes within specified scale or chord, so a "third above" harmony voice actually varies between 3 and four semitones above the lead note where the chromatic harmony would stay exactly 4 semitones (a major 3rd) above each note.

To recap: we have three different harmony modes that use chromatic or diatonic scales.

Shifting, which uses the chromatic, 12 semitone scale, changes the input pitch by a fixed number of semitones:

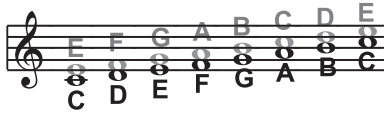


Chordal, which uses the root, third, fifth and sometimes seventh of the many diatonic scales, pitches the harmony voice to the closest note contained within the chord:



Scalic, which uses one of many diatonic scales, pitches the harmony voice to the nearest note contained within the scale:

HARMONY AND TUNING



Theory aside, the best way to get great sound is to experiment with all of VoiceWorks' possible harmony modes. Not only will you develop an intuitive sonic sense of what works best where, but by investigating different permutations and combinations you could discover some delightful sounds you might otherwise have missed.

Just Tuning

Why just tuning? Although probably no one has ever told you this, your expensive grand piano and the last great keyboard synthesizer you bought are both out of tune! Well, to be fair we can say instead that they are all tuned using Equal temperament.

Harmony is the result of the interaction between differing audible frequencies in ratios that sound musical to the human ear. A more exact ratio leads to a nicer sounding harmony. Most instruments (like the piano) are absolute by nature. Each note on the keyboard has a specific pitch. Equal temperament tuning uses approximations for the tuning of each note, allowing us to easily alter the key of our music without re-tuning our instruments. Unfortunately, with this method of tuning we lose the ability to create perfect ratios when playing multiple notes. As a result, much of the harmony you've heard in music has not been perfectly in tune!

The bottom line is that the approximations of equal temperament tuning are practical, but imperfect. Using the VoiceWorks with Just tuning will definitely expand your musical horizons!

Just tuning is practice of maintaining the relative (and perfect) ratios between pitches, creating perfect harmonies.

Singers, especially when performing multi-part a cappella music, base their tuning on how it

harmonically sounds with other singers. The natural tendency, and what sounds best, is to sing with "just tuning" so that beating is minimized. One of the goals in barbershop quartet singing is to strive for "just relative intonation" so that a sub-frequency is audible. Achieving this goal results in what barbershop fans often describe as the coveted "ring and lock" sound. In barbershop music it is the lead singer's responsibility to try to sing the melody as close to the tuning of a piano (equal temperament) as possible. The other singers must then tune their harmonies to the melody using "just relative intonation". The VoiceWorks is able to do this in both the Just and Barbershop tuning modes.

When the Just or Barbershop Modes are selected in the VoiceWorks, the harmony tunings are based on the following relationships:

- Minor 3rd = 3 cycles for every 4 cycles of the input
- Major 3rd = 5 cycles for every 4 cycles of the input
- 5th = 3 cycles for every 2 cycles of the input.

Barbershop differs from Just tuning in Chordal mode. Just tuning will use the root of the chord for the tuning reference, while Barbershop tuning uses the input notes as the tuning reference. For this reason it is better to use Barbershop in an a-cappella situation and Just when playing with other instruments, because Just tuning sounds more in-tune with the other instruments that most likely have equal temperament tuning.

Our best advice is to experiment and use your ears!

MIDI IMPLEMENTATION

Parameter Name	Advanced CC#	GM-Basic CC#	Range / Description
Voice 1 Level	11	46	0-127
Voice 1 Voicing	12	14	Harmony Mode Dependent
Voice 1 Gender	13	29	0-127
Voice 1 Vibrato Style	89	89	0-Number of Styles
Voice 1 Vibrato Amount	90	90	0-100
Voice 1 Pan	16	16	0-127
Voice 1 Active	106	106	0-63 Off, 64-127 On
Voice 2 Level	17	17	0-127
Voice 2 Voicing	18	18	Harmony Mode Dependent
Voice 2 Gender	19	19	0-127
Voice 2 Vibrato Style	92	61	0-Number of Styles
Voice 2 Vibrato Amount	93	62	0-100
Voice 2 Pan	20	20	0-127
Voice 2 Active	107	107	0-63 Off, 64-127 On
Voice 3 Level	21	21	0-127
Voice 3 Voicing	22	22	Harmony Mode Dependent
Voice 3 Gender	23	23	0-127
Voice 3 Vibrato Style	94	88	0-Number of Styles
Voice 3 Vibrato Amount	15	15	0-100
Voice 3 Pan	24	24	0-127
Voice 3 Active	108	108	0-63 Off, 64-127 On
Voice 4 Level	25	25	0-127
Voice 4 Voicing	26	26	Harmony Mode Dependent
Voice 4 Gender	27	27	0-127
Voice 4 Vibrato Style	3	3	0-Number of Styles
Voice 4 Vibrato Amount	105	105	0-100
Voice 4 Pan	28	28	0-127
Voice 4 Active	109	109	0-63 Off, 64-127 On
Harmony Mode	29	Ignored	0-3
Harmony Root	30	30	0-11
Harmony Type	31	31	Harmony Mode Dependent
Harmony Level	35	12	0-127
Harmony Smooth	36	116	0-127
Harmony Lead	37	Ignored	0-63 Off, 64-127 On
Harmony Style	40	Ignored	0-Number of Styles
Harmony Style Amount	41	41	0-127
Harmony Tuning	42	Ignored	0-2
Harmony Portamento	43	84	0-127
Harmony Notes Attack	44	73	0-127
Harmony Notes Release	45	72	0-127
Harmony Latch	95	35	0-63 Off, 64-127 On
Harmony Bypass	110	110	0-63 Off, 64-127 On
Thickening Level	47	Ignored	0-127
Thickening Detune	48	Ignored	0-127
Thickening Spread	49	Ignored	0-127
Thickening Bypass	111	111	0-127

MIDI IMPLEMENTATION

Parameter Name	Advanced CC#	GM-Basic CC#	Range / Description
Fx Level	50	91	0-127
Fx Rev:Delay Mix	51	51	0-127
Fx Lead2Reverb Send	52	52	0-127
Fx Harmony2Reverb Send	53	53	0-127
Fx Aux2Reverb Send	54	Ignored	0-127
Fx Lead2Delay Send	55	55	0-127
Fx Harmony2Delay Send	56	56	0-127
Fx Aux2Delay Send	57	Ignored	0-127
Fx Delay2Reverb Send	58	58	0-127
Fx Reverb Type	59	59	0-13
Fx Reverb PreDelay Level	60	Ignored	0-127
Fx Reverb Decay Time	61	Ignored	0-127
Fx Reverb Color Low Freq	62	Ignored	0-6
Fx Reverb Color High Freq	46	Ignored	0-6
Fx Delay Type	63	63	0-2
Fx Delay Time	14	Ignored	0-127
Fx Delay Feedback	65	45	0-127
Fx Delay High Freq Damp	66	Ignored	0-127
Fx Delay Source	116	Ignored	0-22
Fx Bypass	112	112	0-63 Off, 64-127 On
Correction Scale Root	67	47	0-11
Correction Scale Type	68	48	0-5
Correction Window	69	49	0-127
Correction Attack	70	54	0-127
Correction Amount	71	57	0-127
Correction Scale LSB	117	117	*Special
Correction Scale MSB	118	118	*Special
Correction Bypass	113	113	0-63 Off, 64-127 On
Setup Dry Level	72	13	0-127
Setup Lead Pan	73	10	0-127
Setup Low Cut	74	Ignored	0-3
Setup Dynamics	75	60	0-3
Setup Comp Threshold	76	Ignored	0-127
Setup Comp Ratio	77	Ignored	0-13
Setup Gate	78	Ignored	0-127
Setup EQ Routing	79	44	0-3
Setup Low Shelf Freq	80	80	0-127
Setup Low Cut Boost	81	81	0-127
Setup High Shelf Freq	82	82	0-127
Setup High Cut Boost	83	83	0-127
Setup Mid Freq	84	50	0-127
Setup Mid Boost	85	85	0-127
Setup EQ Q	86	86	0-127
Setup Output Level	87	87	0-127
Setup Global Effect	88	Ignored	0-100
Sustain Pedal	64	64	0-63 Off, 64-127 On
			Affects performance in Notes and Chord Mode presets only.

Note: Wherever applicable, the entire CC range is mapped to a given parameter.

MIDI IMPLEMENTATION

Parameter Name	Advanced CC#	GM-Basic CC#	Range / Description
Setup FootSwitch 1 Assign	102	102	0-9
Setup FootSwitch 2 Assign	103	103	0-9
Setup FootSwitch 3 Assign	104	104	0-9
Bypass All	114	114	0-63 Off, 64-127 On
Harmony Hold CC Control	119	119	0-63 Off, 64-127 On
Global Vibrato	1	1	0-127
Song Step Forward	115	115	>63, Song Steps Forward"
Song Step Backward	9	9	>63, Song Steps Backward"

*Special CC's (same for both the Advanced and GM-Basic CC maps)

Pitch Correction Scale Notes	118	MSB	0nnpqrsB (Binary Pattern)
		nn	reserved
		o=1	C note on
		p=1	C#/Db note on
		q=1	D note on
		r=1	D#/Eb note on
		s=1	E note on
	117	LSB	0tuvwxyzB
		t=1	F note on
		u=1	F#/Gb note on
		v=1	G note on
		w=1	G#/Ab note on
		x=1	A note on
		y=1	A#/Bb note on
		z=1	B note on
		o...z=0	notes off use 0 value

Example Custom Scale Message:

Intended scale: C, E, G, B based on a C root. This scale may be transposed by changing the scale root.

Message: CC#118, 00010001 (converts to 17 decimal), CC#117, 00010001 (17 decimal)

MIDI Program Change messages result in a Song Number change while in **song mode**. In any other mode, MIDI Program Change messages result in a Preset Number change.

Note: To capture the desired correction scale you can change the correction scale from the front panel and record the MIDI out.

Other MIDI messages:

Program Change: Received/Transmitted. In song mode only received
- changes song number.

Pitch Bend: Received. Controls Pitch or Gender, assignable in preset.

Note On/Off: Received.

TECHNICAL SPECIFICATIONS

Digital Inputs and Outputs

Connectors: RCA Phono (S/PDIF)
Formats: S/PDIF (24 bit), EIAJ CP-340, IEC 958
Sample Rates: 44.1 kHz, 48 kHz
Frequency Response DIO: DC to 22/23.9 kHz \pm 0.01 dB @ 44.1/48 kHz

Analog Inputs

Connectors, balanced: Mic.: XLR, Line: 1/4" phone jack
Impedance: Balanced/Unbalanced Mic.: 3.6/1.8 kOhm, Line: 21/13 kOhm
Line Input Level @ 0 dBFS: 24 dBu to 0 dBu
Line Sensitivity @ 12 dB headroom: -12 dBu to 12 dBu
Mic. Input Level @ 0 dBFS: Pad Off/On -14 dBu/6 dBu to -51 dBu/-31 dBu
Mic. Sensitivity @ 12 dB headroom: Pad Off/On -26 dBu/-6 dBu to -63 dBu/-43 dBu
Line, Mic. @ Min gain, Dynamic Range: > 92 dB, 20 Hz - 20 kHz
NF/Vi @ Max. micamp. gain, Rg = 200 Ohm: < 2 dB / -127.4 dBu
THD: < -100 dB (0.001 %) @ 1 kHz
Line Frequency Response: +0/-0.1 dB, 20 Hz to 20 kHz
Mic. Frequency Response, max gain: -1.5 dB @ 40 Hz, +0/-0.1 dB (200 Hz to 20 kHz)
Crosstalk: < -85 dB, 20 Hz to 20 kHz
A to D Conversion: 24 bit, 128 x oversampling bitstream
A to D Delay: 0.65/0.70 ms @ S.R. = 48/44.1 kHz

Analog Outputs

D to A Conversion: 24 bit, 128 x oversampling bitstream
D to A Delay: 0.63/0.68 ms @ S.R. = 48/44.1 kHz
Connectors, balanced: 1/4" phone jack
Output Impedance: 40 Ohm
Max. Output Level: Balanced/Unbalanced 20 dBu/14 dBu, R-load = 1200 Ohm
Output Range: Variable up to +20 dBu
Dynamic Range: > 104 dB, 20 Hz to 20 kHz
THD: < -98 dB (0.0013 %) @ 1 kHz
Frequency Response: +0/-0.3 dB, 20 Hz to 20 kHz
Crosstalk: < -100 dB, 20 Hz to 20 kHz

EMC

Complies with: EN 55103-1 and EN 55103-2
FCC part 15, Class B, CISPR 22, Class B

Safety

Certified to: IEC 65, EN 60065, UL6500 and CSA E60065
CSA FILE #LR108093

Environment

Operating Temperature: 32° F to 122° F (0° C to 50° C)
Storage Temperature: -22° F to 167° F (-30° C to 70° C)
Humidity: Max. 90 % non-condensing

Control Interface

MIDI: In/Out/Thru: 5 Pin DIN
Pedal: 1/4" phone jack

Supplementary

Display: 16x 2 character LCD display
Dimensions: 19" x 1.75" x 8.2" (483 x 44 x 195 mm)
Weight: 4.1 lb. (1.85 kg)
Mains Voltage: 100 to 240 VAC, 50 to 60 Hz (auto-select)
Power Consumption: <15 W
Warranty Parts and labor: 1 year

Due to continuous development these specifications are subject to change without notice.

PRESET LIST

Mixed Modes

- 1 Hit Vocals
- 2 Vibrato Sync
- 3 Barbershop
- 4 Church Choir
- 5 Subtle Lead
- 6 Solo Vibrato
- 7 Super Octavs
- 8 Super Thick
- 9 Midi Notes
- 10 Radio Voice

Scale Mode

- 11 Fat Lead+3rd
- 12 Fat 3rd +5th
- 13 Fat-4th +3rd
- 14 Fat-6th -4th
- 15 Fat-6th +5th
- 16 SuperFat 3rd
- 17 7th chord
- 18 Jazz Guys
- 19 WayUp Scale
- 20 Upper Tight
- 21 Natural
- 22 Lower Scale
- 23 Mixed Quint
- 24 Scoop Quint
- 25 Loose Quint
- 26 Quintet Sprd
- 27 Kids Backing
- 28 Two Towers
- 29 HardCor+Harm
- 30 MinorCartoon

Chord Mode

- 31 Four Above
- 32 Three Above
- 33 1 Down 2 Up
- 34 2 Down 1 Up
- 35 Three Below
- 36 Four Below
- 37 3 WayUp+Bass
- 38 3 Above+Bass
- 39 1Dn 1Up+Bass
- 40 2Dn 1Up+Bass
- 41 3 Down+Bass
- 42 Mixed ChoirM
- 43 Mixed ChoirF
- 44 2 X 2 High
- 45 2 X 2 Above
- 46 2 X 2 Near
- 47 2 X 2 Below
- 48 2 X 2 Spread
- 49 Clouds
- 50 Thick Above

Shift Mode

- 51 Funky Octavs
- 52 Gregorians
- 53 Funky Fifths
- 54 Doubled Tons
- 55 Doubled +Vib
- 56 BigGuysSing
- 57 DownAnOctave
- 58 Up An Octave
- 59 Urban Double
- 60 Porta-Pitch

Special Effect

- 61 Giant
- 62 Helium
- 63 Dragon Kid
- 64 Arnold
- 65 Shout
- 66 Characters
- 67 Little Guy
- 68 Mice
- 69 Robo Dom7
- 70 Try 2 Speak

Pitch Correction

- 71 HardCorrectC
- 72 MedmCorrectC
- 73 SoftCorrectC
- 74 Just Pentatn
- 75 PentCorrectC

Lead Voice

- 76 PickYourAge1
- 77 PickYourAge2
- 78 Nice Vibrato
- 79 Soft Vibrato
- 80 MaturVibrato

Notes Mode

- 81 ScarBroFair
- 82 Emotinotes
- 83 Latched M&F
- 84 Vox Pad
- 85 Robot Pong
- 86 Mono Porta
- 87 Slap+Midi
- 88 4notesLatch
- 89 RoboPad

PRESET LIST

Delay/Reverb

- 91 TapPing
- 92 Slap
- 93 Ping-Pong
- 94 MiniShift
- 95 Bright Hall
- 96 Chamber
- 97 Live Room
- 98 Cavernous
- 99 Revved Delay

Blank

- 100 Blank Preset