QuantiZer

NOTE CV

SCALE CV

1V/Oct OUT

RESET IN

CLOCK IN

Major

Minor

Reset

Record

Force 0V

Clear

KEYBOARD

Keys

Scale Edit

Transpose

Input Range

SLIDER

Notes

Portamento

Transpose

Octave

Input Range

Octave

5

4

3

2

1

S1

S2

Save

Load

B

Bb

A

Ab

G

16th

Gb

DIN

F

DAW

E

Sync

Eb

+/-5v

D

+5v

Db

+10v

C

TIPTOP audio

Tiptop Audio
QuantiZer manual

The QuantiZer is a digital processor driving high precision analog CV circuitry. In its input it takes CV signals from Sequencers, LFOs, Envelopes or pretty much any other module that produces CV signals, and, in less than half a millisecond, it outputs CV converted to western chromatic scales to drive VCOs in a modular. Without QuantiZer conversion it is hard to dial in specific notes in a musical scale, so the QuantiZer offsets the voltage to match exact notes; therefore, the QuantiZer could be called a CV-to-musical-note converter. The beauty of the QuantiZer comes from the ability to add and subtract notes from the scale, transpose sequences, switch musical scales, add portamento and much more all from the front panel, which makes for a creative tool to control and adjust melodies as they play through the QuantiZer.

The QuantiZer can work in two different modes: Free Run, where CV input gets immediately converted to the output, or Trigger mode, where CV input only gets converted when a trigger signal is sent to the CLOCK input. Trigger mode is very useful to synchronize the conversion process with other events in your modular, and it is also a great mode for experimentation by sending non repetitive trigger signals.

This manual has two parts: the first section has tutorials for using various features; the second section has detailed information about the connections and functions of the module.

QuantiZer Basics PATCH 1:

Using the Keys or Slider to set Pitch:

- Patch the QuantiZer **1V/Oct OUT** to the Z3000 **1V/Oct In**
- Patch one of the Z3000 waveform outputs to a sound system to hear it.
- On the QuantiZer click **FORCE 0V**, all lights will turn off and the QuantiZer will be forced to output 0V
- Adjust the Z3000 to 65Hz or click the Z3000 yellow button once to turn on the tuner and adjust it to show Note C2. The Z3000 is now tuned.
- Click on **Force 0V** again, and click on Keyboard until the **KEYS** function is on. The QuantiZer is set to a CV keyboard, clicking on the notes on the right side will make the Z3000 play this octave. Notice the QuantiZer will quantize the key selection to the active notes (green lights) of that scale.
- Click on **KEYBOARD** again until the light of this section are off
- Click on **SLIDER** and set it to **NOTES**, play the slider, to hear the Z3000 play all 5 Octaves.

Using the Z8000 as CV source: (please see drawing in next page)

- Plug a clock signal into your Z8000 Up and Down Column Input
- plug the CV out from Z8000 Up/Down into the **NOTE CV** jack on the QuantiZer.
- Set the **SLIDER** lights to off,
- set **KEYBOARD** to **SCALE EDIT**.
- Program some notes on the knobs on the Z8000
- Start the Clock source and the notes are quantized and sent to the Z3000 according to keys of the selected scale, the green lights are the active notes, red light is the currently playing note.

- In **SCALE EDIT** mode add or remove notes by clicking on them to hear how useful it is to adjust and play the QuantiZer that way.

- Click on **KEYBOARD** and change to **TRANSPOSE** to use the keyboard to transpose your se quence by that amount. For example, pressing D will shift the sequence up two semitones.

- Click on **KEYBOARD** to turn its modes off, click on **SLIDER** and select **TRANSPOSE**, use the slider to transpose the sequence.

- Click on **SLIDER** and select **OCTAVE**, use the slider to transpose the sequence in steps of 1 octaves.

- Click on **SLIDER** and select **PORTAMENTO**, bring the slider down and the start bring it up to add portamento effect to the notes.

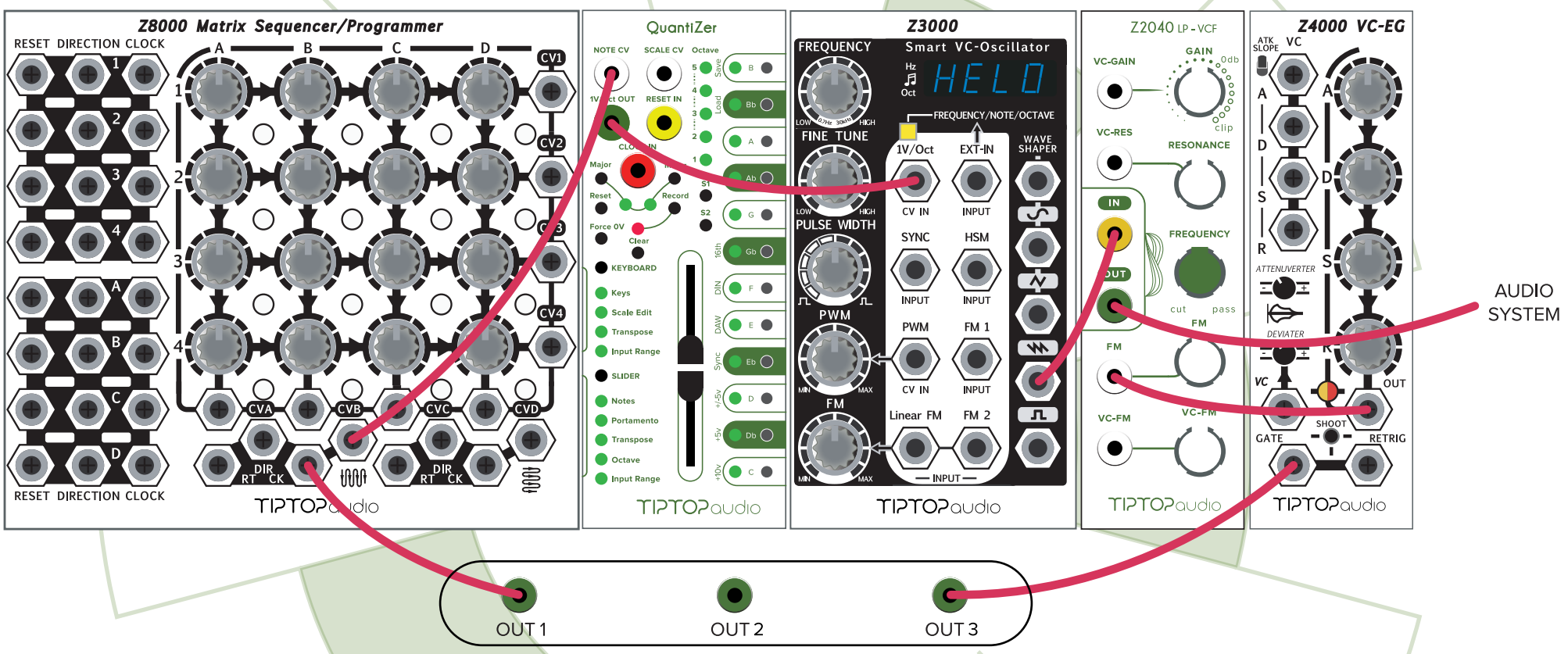
Tip: At any given time if you feel lost or wish to start over, press and hold the **RESET** button which will reset the module to last saved settings.

Using different scales:

- Click on Major, then click on note F on the right side keyboard and the green lights will change position to show the new selected scale, which might change in the sequence as CV in is converted now to F Major scale.
- Click Major then Gb to hear the switch again, click on Minor then D; musical progressions can be made by switching scales.

If the VCO tuning has gone off, click on FORCE 0V and readjust the Z3000 to read note C (65Hz) then click FORCE 0V to get back to playing.

THE BASIC SYNTH PATCH USING THE QUANTIZER



CIRCADIN RHYTHMS OR TRIGGER RIOT OR Z3000 PULSE OUT

QuantiZer Basics PATCH 2:

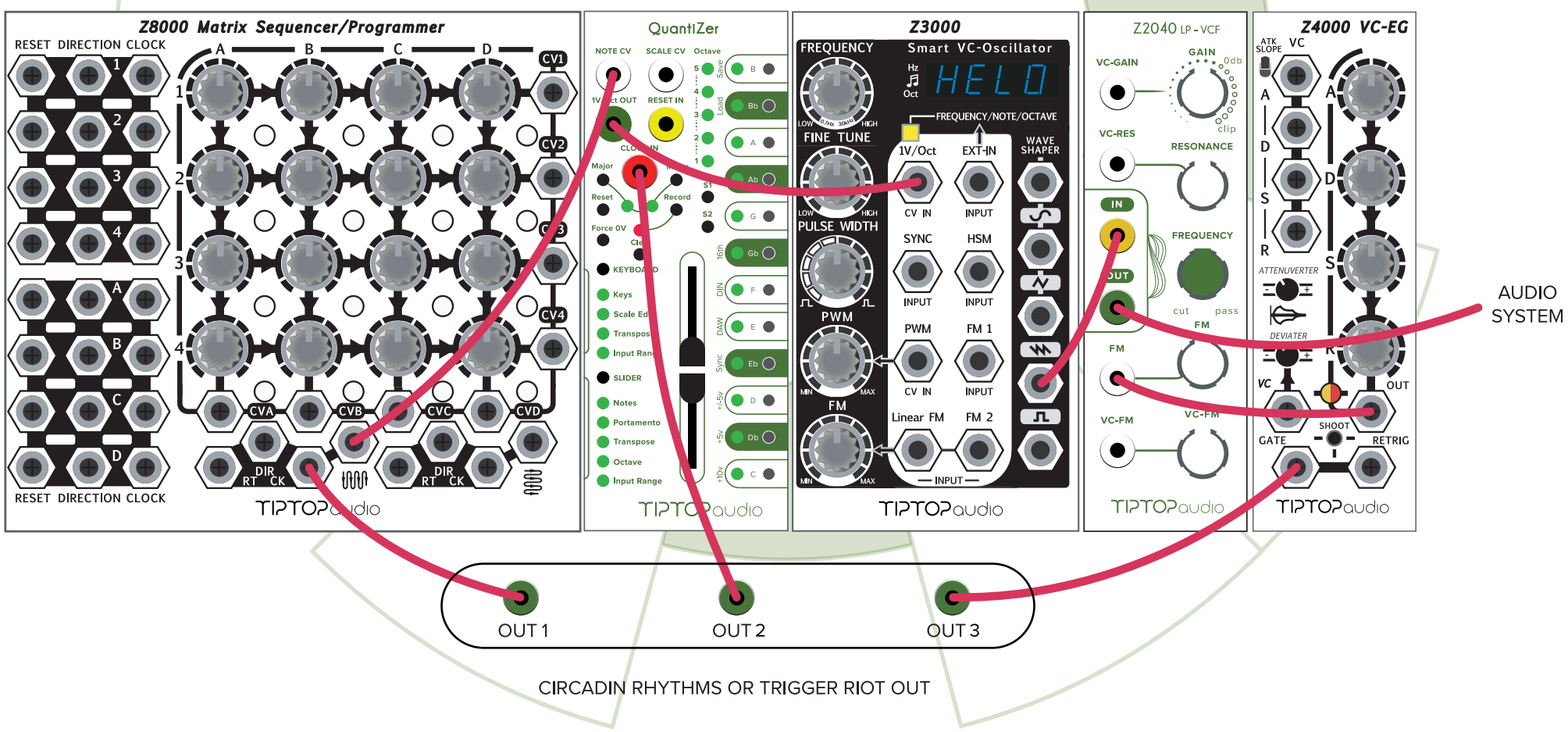
When using patch 1 transposing and other functions might sound a bit glitchy, that is because the QuantiZer is not synchronized to the Z8000 clock. To sync the quantization switch the QuantiZer to Trigger mode.

- Click on **KEYBOARD**, select **INPUT RANGE**
- On the keyboard select Trig (it is on Note A) so its light is Green
- Click on **KEYBOARD** to go back to Scale Edit.
- The QuantiZer will not quantize notes anymore until we apply a trigger signal into the **CLOCK IN** jack.
- Using a Stackable patch the same trigger signal that goes to the Z4000 into the **CLOCK IN**

The QuantiZer will now quantize when a trigger is sent. With this function you can select when to quantize, so try experimenting with other pulse sources to see how creative this can be.
For example: use one channel of the Trigger Riot or Circadian to trigger the Z8000 cv sequencer, another channel to trigger the Z4000 envelope, and another channel to trigger the QuantiZer, each channel have different trigger timings, this can go really deep with unexpected very complex sequencing. Follow the patch below

Note * : In Trig mode Portamento is not active.

THE BASIC SYNTH PATCH USING THE QUANTIZER IN TRIGGER MODE



QuantiZer Recording PATCH 3:
The QuantiZer can record and play back notes played on the keyboard; we call it the Sketch Pad. You can create sequences up 512 steps with manual entry of notes. Lets give it a try.

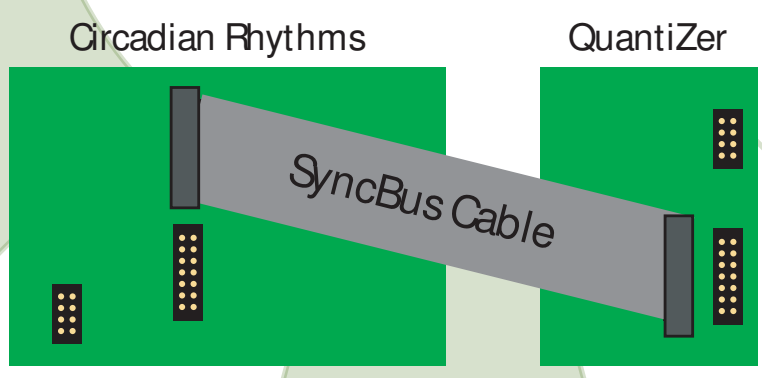
- Plug a clock signal into the **Clock In jack**
- click on **RECORD**, the QuantiZer now start recording, the Record light turns red,
- Play the notes in time on the keyboard,
- To finish click on **RECORD** again, the red light will start flash and the recorded sequence will play back

- Hit the **RESET** and the sequence will reset to step 1, sending a Trigger into the **RESET** input will control the reset externally.
- Click on **RECORD** again to stop recording. try recording again, this time use the slider to Transpose or jump in octaves.
- To clear the memory hold down **CLEAR** until all lights turn off for a bit.

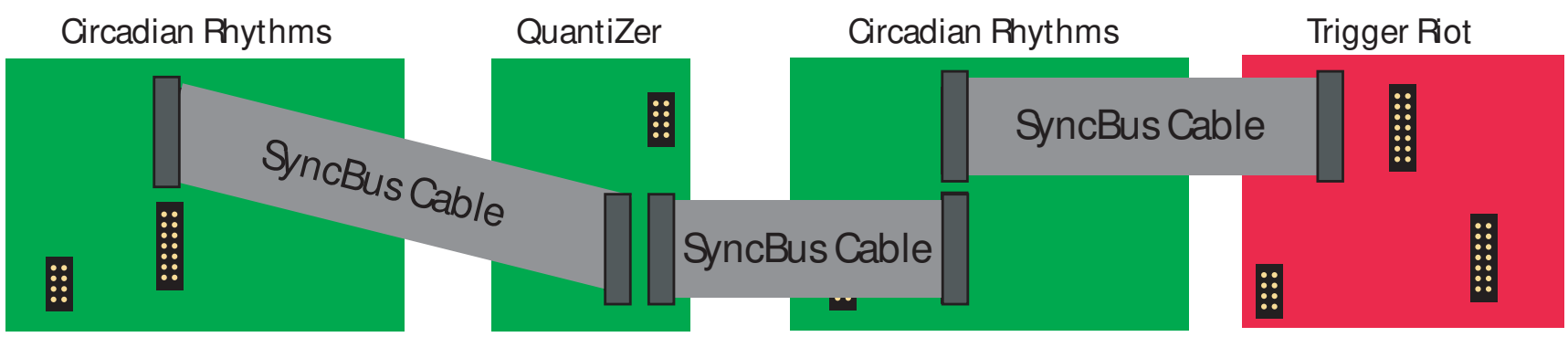
QuantiZer as Sketchpad for Circadian Rhythms:
The QuantiZer recording function can be made to follow the Circadian Rhythms time line precisely. To do that patch a Tiptop SyncBus cable from the Circadian SyncBus out to the QuantiZer SyncBus in. See drawing below.

Syncbus drawing:
- Setup the QuantiZer to receive SyncBus signals, click on KEYBOARD and select **INPUT RANGE**, on the keyboard select Sync.
- On the Circadian Rhythms Click on **Boss** twice to make the Circadian the ‘boss’ of the QuantiZer.
- Set a loop on the Circadian, for example a loop of eight presets,
- click **RECORD** on the QuantiZer the LED turns red, once the Circadian loops the QuantiZer will detect that and flash the led indicating recording started, it will automatically finish recording and start playback when the loop on the Circadian restart. These notes are saved in the QuantiZer memory and will play back only when that exact preset is playing. That way you can add notes in different areas of the Circadian timeline.
- To clear the memory hold down **CLEAR** till all light turn off for a bit.

Circadian Rhythms sequencer connect to QuantiZer with SyncBus



Multiple SyncBus devices connected together



QuantiZer features:

- Precision ADC that accepts three ranges: 0-5V, 0-10V and +/-5V
- Precision DAC with low offset and drift with a 0-5V output range
- Free Running or Triggered Quantization
- Clock and Reset inputs
- CV Sketch Pad for recording notes using the Keyboard
- SyncBus connector for easy interface with other TTA devices
- Scale Input to change the scale via CV
- Slider input for setting Transpose, Portamento and other values
- Keyboard input to select notes for scale and other features
- Keys for selecting Major and Minor scales
- User edited scales that can be saved to internal EEPROM
- USB port for software updates

Connections:

Note CV: Input for analog Control Voltage to be Quantized. Three ranges are possible for input: 0 to 10 volts, 0 to 5 volts and -5 to +5 volt

Scale CV: Input for CV control of the Scale selection or Transpose amount. Not 1V/Oct.

1V/Oct: Processed and Quantized output

Clock In: Clock pulse input for 5V triggers. There are three clock modes: 16th, DIN and DAW

Reset In: 5V input for Reset of the internal counter. This can either be a single pulse or DIN Run signal

SyncBus: Two sets of multi-pin connectors on the back PCB. Use a SyncBus cable to connect to other TipTop Audio SyncBus enabled devices like the Trigger Riot and Circadian Rhythm.

USB Port: A standard USB Type A port on the rear PCB to attach a USB Flash drive in order to update the device firmware.

Controls:

Keyboard: 12 switches corresponding to the Western 12 note scale from C to B. There are 4 modes for the keyboard:

- **Keys** to directly output a specified note to the 1V/Oct output. This can be used like a stan dard one octave keyboard.
- **Scale Edit** to select notes to include or exclude from the current Scale
- **Transpose** to input the amount of transposition in single note increments. For example, pressing E will shift all output up 4 semitones (C becomes E, D becomes Gb).
- **Input Range** controls the settings for voltage range, Clock format, saving and more

Slider: a 40mm pot for inputting the following data:

- **Notes** outputs a quantized pitch directly to the 1V/Oct output. The entire 5 octave ranges is available via the slider.
- **Portamento** sets the slew rate between notes. The slewed output is not quantized in between the input notes for smooth pitch bend effects.
- **Transpose** inputs the amount of transpose from 0 to 12 semitones. The transpose amount is in semitones.
- **Octave** shifts the output up from 0 to 4 octaves.
- **Input range** selects the input range: 0-5V, 0-10V and +/-5V

Scale selection buttons: Press once to enable the scale type and then select the scale using the keyboard (for A minor press Minor button then the A button on the keyboard, etc). Available scales:

- **Major** selects a scale corresponding to the Western Major scale.
- **Minor** selects a relative Minor scale.
- **S1** is the first bank of 12 user scales.
- **S2** is the second bank of 12 user scales

Note that the Scale CV overrides the manual selection of a scale, so disconnect the Scale CV input or send 0V to it. Also, CV only changes within the 12 available Scales selected by the Maj/Min/S1/S2 buttons.

Editing Scales:

- Change the Keys mode to ‘Scale Edit’
- Select S1 or S2
- Add or Remove Notes from the Scale
- Scales need to be saved using Save in the Input Range mode of Keys to be recalled on the next power up

Record buttons:

- Record has three states:
- Off where the Note CV is directly sent to 1V/Oct,
- On where the Note CV is recorded using the Keyboard and Slider
- Play where each clock plays recorded values from memory

Reset sets the record or playback to the first position in memory

Clear erases all of the recorded values in memory when held

Force 0V disables all Quantization and sends 0V to the 1V/Oct output. This is used for calibration and tuning of 1V/Oct devices.

Display LEDS:

- Keyboard LEDs in all modes but Utility use Green to show which notes are in the current Scale and a Red LED to indicate the current output pitch.
- Keyboard LEDs display the current mode for the keyboard. When none are lit the keyboard does not modify anything
- Slider LEDs show the current mode of the slider. When no LEDs are lit the slider does not modify anything.
- Record LED is Off when recording is off, steady when Recording is On and flashing when Playback is running.
- Scale LEDs are solid for Major and Minor and flash for S1 and S2
- Octave indicates which octave the current output is in

Tuning a Z3000 VCO:

- Connect 1V/Oct output of the QuantiZer to the 1V/Oct input on the z3000
- Press the Force 0V button. The output will be 0V from the QuantiZer.
- Change the z3000 display to indicate Notes
- Turn the Coarse and Fine tuning knobs until the z3000 display shows a C pitch (C0, C1, C2 etc)
- The QuantiZer and z3000 will now have a range of that note plus five octaves (ex.C1 to C6)

Transposing Methods:

- Keys Transpose mode. In this mode the Keyboard is used to select the amount of transpo sition upward in semitone steps. Selecting C is 0 transposition while B is 11 steps up.
- Slider Transposition mode. In this mode the Slider sets the amount of transpose from 0 to 11 steps up.
- Slider Octave mode moves the transposition up by 12 steps each octave.
  Note that the Octave and Transposition are additive so transposing up one octave and 5 steps is a 17 step upward transpose.
- Transpose CV input up to 11 steps. See Input Range Settings on how to select.

Note that Transpose values are additive so 5 steps on the Keys or Transpose CV plus one octave shifts up 17 steps.

Portamento :

Portamento creates a glide between quantized values for more natural pitch bend type effects. The slider in Portamento mode sets the length of the glide time from microseconds to a few seconds. It is very important to note that **when Portamento is used all Quantization is disabled** in order to generate the values in between the pitches. Internal math does attempt to correct for errors but the output will not be as precise as without Portamento, and as the Portamento time is increased the errors become greater.

Recording Using CV Sketch Pad:

The QuantiZer can record up to 512 16th note steps which matches the internal 16th note memory of the Circadian Rhythm step sequencer. The QuantiZer will follow the Group/Preset when using the Circadian as a master clock (‘Boss’) over Syncbus.

The QuantiZer can accept a variety of clock formats including SyncBus from other Tiptop Sequencers. The clock format is set using the ‘Input Range’ mode of the the Keyboard. Be sure to read the following ‘Clock Formats’ section to understand which format to use.

The CV recorder is intended to run at tempos between 2 and 300 bpm and have enough resolution to cover any notes values entered in that range.

Clock formats:

- 1**6th**, a 4 PPQ pulse used by many analog sequencers. The Reset In with this clock format is a single pulse that resets the internal counter to 0.
- **DIN**, a clock mode designed exclusively to work with vintage Roland TR/TB devices. The clock uses internal delays to compensate for the slow processing speed of the early micro processors. The Reset In is the DIN Sync ‘Run’ signal that goes high when playback starts (which is also a reset) and low when the clock stops.
- **DAW**, a 24 PPQ clock similar to the DIN standard but without any delays and the Reset In a single pulse which resets the internal counter to 0.
  This is designed for use with synchronization with a computer DAW application.
- **SyncBus**, the interconnection designed by TipTop Audio to sync clock based devices. This cable carries clock, reset and preset data in parallel. The clock runs at 96 PPQ which effectively replaces the internal clock of a device with this signal. Sync accuracy is down to the microsecond level, and devices change presets in sync as well.

SyncBus is highly recommended for use with the Circadian Rhythm. The QuantiZer will precisely follow the Group, Preset and Step of the CR in this mode.

Recording can be done either manually using the Record button to start and stop, or by sending reset pulses to the Reset In to start and stop. Using Reset is highly recommended for all recording to maintain sync on playback.

The Record button toggles between three states:

Off - In this state the internal CV conversion is either ‘Free Run’ or ‘Triggered based on the TRIG setting in ‘Input Range’ mode.

Record - CV values are generated using the Keyboard ‘Keys’ and Slider ‘Octave’ as controls. Recording is done in real-time. The Record start and stop are governed by external resets.

Playback - Recorded CV values are played from internal memory based on the incoming clock. The Note CV and Scale CV are ignored as are the UI features of the keyboard and fader. The Record LED will flash to the tempo of the clock in this mode.

Input Range Settings:

The QuantiZer settings are changed by using the Input Range option on the Keyboard.

B - Save - Write all settings and recorded data to the internal EEPROM. Memory is recalled on reboot.

A - Trig - Toggles the Triggered Quantization On (LED ON) and Off (LED OFF). Triggered Quantization only Quantizes new values when a trigger is sent.

Ab - KeyQ - Sets the level of Quantization to 16th notes (LED ON) and full resolution (LED OFF)

G - Scale/Transpose - Changes the function of the Scale CV input from Transpose Amount (LED OFF) to Scale Selection (LED ON).

Gb - 16th - Selects 16th notes with Resets as the Clock Format

F - DIN - Selects DIN Sync with Run as the Clock Format

E - DAW - Selects DAW with Resets as the Clock Format

Eb - Sync - Selects Syncbus as the Clock Format

D - +/-5V - Voltage range for the Note CV is -5V to +5V

Db - +5v - Voltage range for the Note CV is 0 to 5V

C - +10V - Voltage range for the Note CV is 0 to 10V

Clearing Memory:

- Hold the Clear button until all of the LEDs go blank
- All of the memory is now cleared of Note data.

Saving CV data and States:

The QuantiZer has onboard memory that stores data between power cycles. The data must be manually saved by the user!

- Change Keyboard to ‘Input Range’ Mode
- Press the Save (B) button
- The Record LED will light solid Red during the save
- The data is saved and will be recalled on the next power up

Software Reset:

Instead of having to power down the system and power it up again, this module has a Software Reset. Hold down the Reset button until the LEDs go blank. If a USB stick is present the module will read the firmware off it to update.

Firmware Update:

USB drive needs to be formatted as MSDOS FAT32 format. On the Mac, make sure to format as Master Boot Record (MBR) when formatting. This can be found be clicking the ‘Options’ button in the ‘Partitions’ tab of Disk Utility.

- Power down the case.
- Remove module from case keeping the power connected to the power busboard.
- Insert USB Flash drive into USB port on the rear of the module.
- Hold the ‘C’ button on the QuantiZer scale down.
- Power up the case.

Or remove module, attach USB and hold down Reset to do a Software Reset.

The REC led will flash while performing the update and the module will enter the last saved state when done.

Clearing the EEPROM:

On Power Up or Software Reset, Hold down the ‘Clear’ key on the keyboard to clear the EEPROM. The Record LED will turn Red while the EEPROM is cleared - note this may take some time to do.

Specifications:

Note CV: 0-10v, +/-5v, +/-10v User selectable

Scale CV: 0-10v (not 1V/Oct)

1v/Oct: 0-5v

Quantized voltage accuracy: +/- <1mv from 0 to 5 volts

Clock/Reset In: 0-12v Trigger or Gate

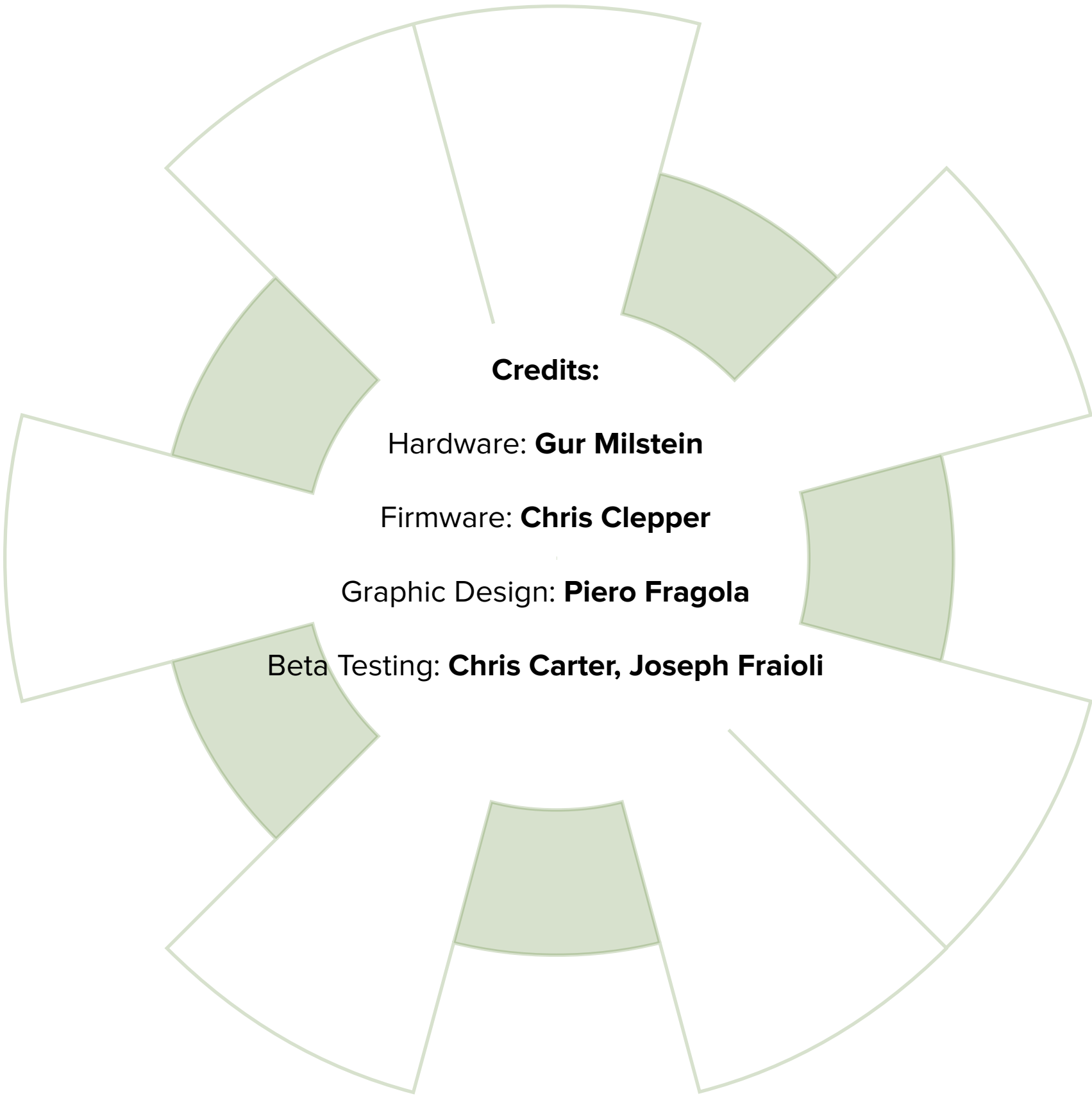
Triggered Quantization Clock in pulse to 1v/oct output: < 500 microseconds (0.5 ms)

Recorded voltage Clock In pulse to 1v/oct output: <100 microseconds (0.1ms)

Width: 10HP

Depth: 43mm

Power Consumption:
+12V: 60 ma
-12V: 5 ma



Credits:

Hardware: **Gur Milstein**

Firmware: **Chris Clepper**

Graphic Design: **Piero Fragola**

Beta Testing: **Chris Carter, Joseph Fraioli**