Kiwi-1000

KIWITECHNICS UPGRADE

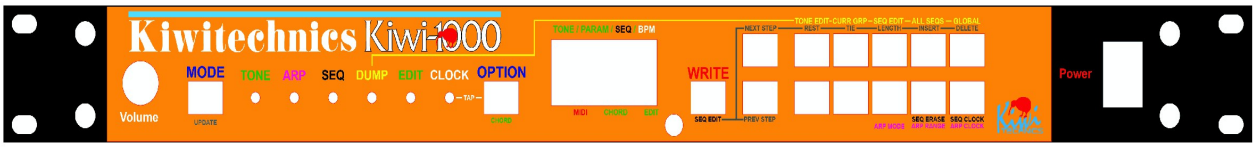


Table of Contents

Kiwi-1000 Features

- 2000 Tones in two 1000 tone Sets can be stored and edited. It is also possible to temporarily edit any Tone.
- Tones can be edited using the front panel or midi.
- Expanded DCO Range and separate clocks for DCO 1 & 2. The original M-1000 had a single clock for both DCOs with no range select. Each DCO now has the range 2' to 64'.
- Tones are stored in Flash memory so no battery is required.
- MidiCC & Sysex support for all parameters and Midi Sysex support for Tone Dump & Load. The Oberheim midi issues are fixed. The Kiwi1000 will support full midi control and editing in real time.
- Key Assign Modes are Poly Single, Poly Dual, Poly Triple, Unison & Solo
- Each Key Assign mode can have Staccato/Legato, Steal/No Steal with five steal modes (Highest, Lowest, Oldest, Newest, Quietest)
- Portamento in all modes
- DCO Key Assign Detune available in all key modes. In addition there is a 'Analog Feel' parameter that add an adjustable small random frequency to each note. Detune is best used with Poly Dual, Poly Triple or Unison keying modes for greatest effect
- Three independent envelope generators. These are traditional ADSR type. Each ENV Mod can select from ENV 1 - 3 and has an Inverted or Normal modes.
- Three independent Low Frequency Oscillators with 6 waveforms each. Each LFO Mod can select from LFO 1-3. LFOs can be plus and minus base note or plus base note only.
- Internal Master Clock with the range 5-299 BPM.
- Full Matrix mod system that can channel any mod source to any mod destination.
- A quality Front Panel Overlay is provided with the Kiwi-1000 upgrade

CHORD MODE

- Any chord with up to 6 notes can be set and played from any key

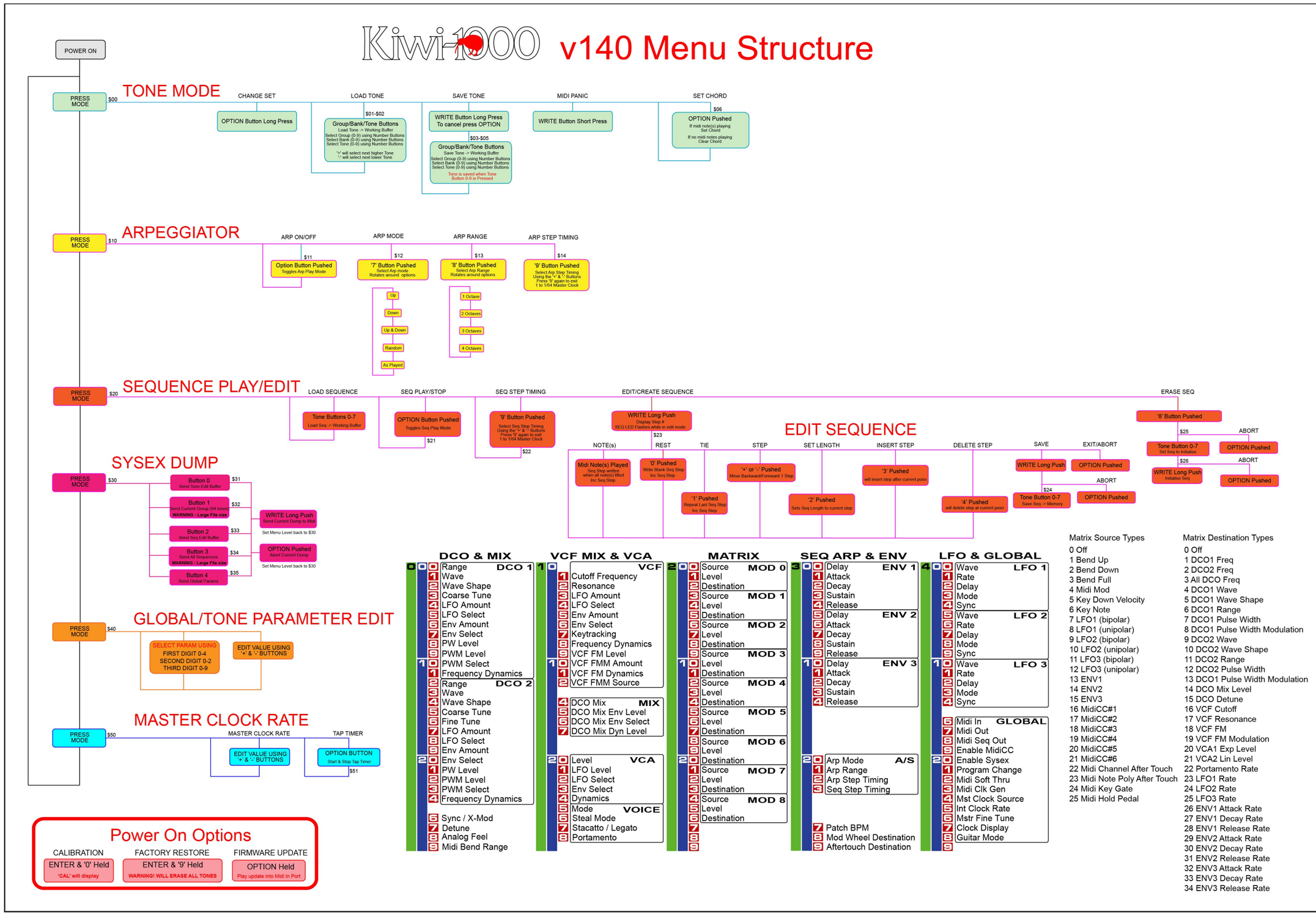
ARPEGGIATOR

- The Arpeggiator is clocked from the Master Clock and can be independently divided to Half Note, Quarter Note, 1/8 Note, 1/8 Note Half Swing, 1/8 Note Full Swing, 1/8 Note Triplets, 1/16 Note, 1/16 Note Half Swing, 1/16 Note Full Swing, 1/16 Note Triplets, 1/32 Note, 1/32 Note Triplets, 1/64 Note.
- Arp modes are Up, Down, Up and Down, Random, As Played and 1, 2, 3 or 4 octaves
- Arp can be Started, Stopped & Continued using Midi Commands
- Appeggiator will Output Midi Data

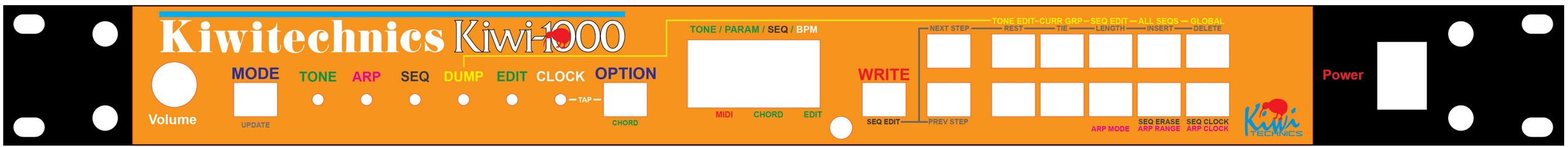
SEQUENCER

- 8 separate 124 Max step Polyphonic sequences can be created and stored
- Sequences can be edited
- The Sequencer is clocked from the Master Clock and can be independently divided to Half Note, Quarter Note, 1/8 Note, 1/8 Note Half Swing, 1/8 Note Full Swing, 1/8 Note Triplets, 1/16 Note, 1/16 Note Half Swing, 1/16 Note Full Swing, 1/16 Note Triplets, 1/32 Note, 1/32 Note Triplets, 1/64 Note.
- Sequencer will Output Midi Data

Kiwi 1000 Flow Chart

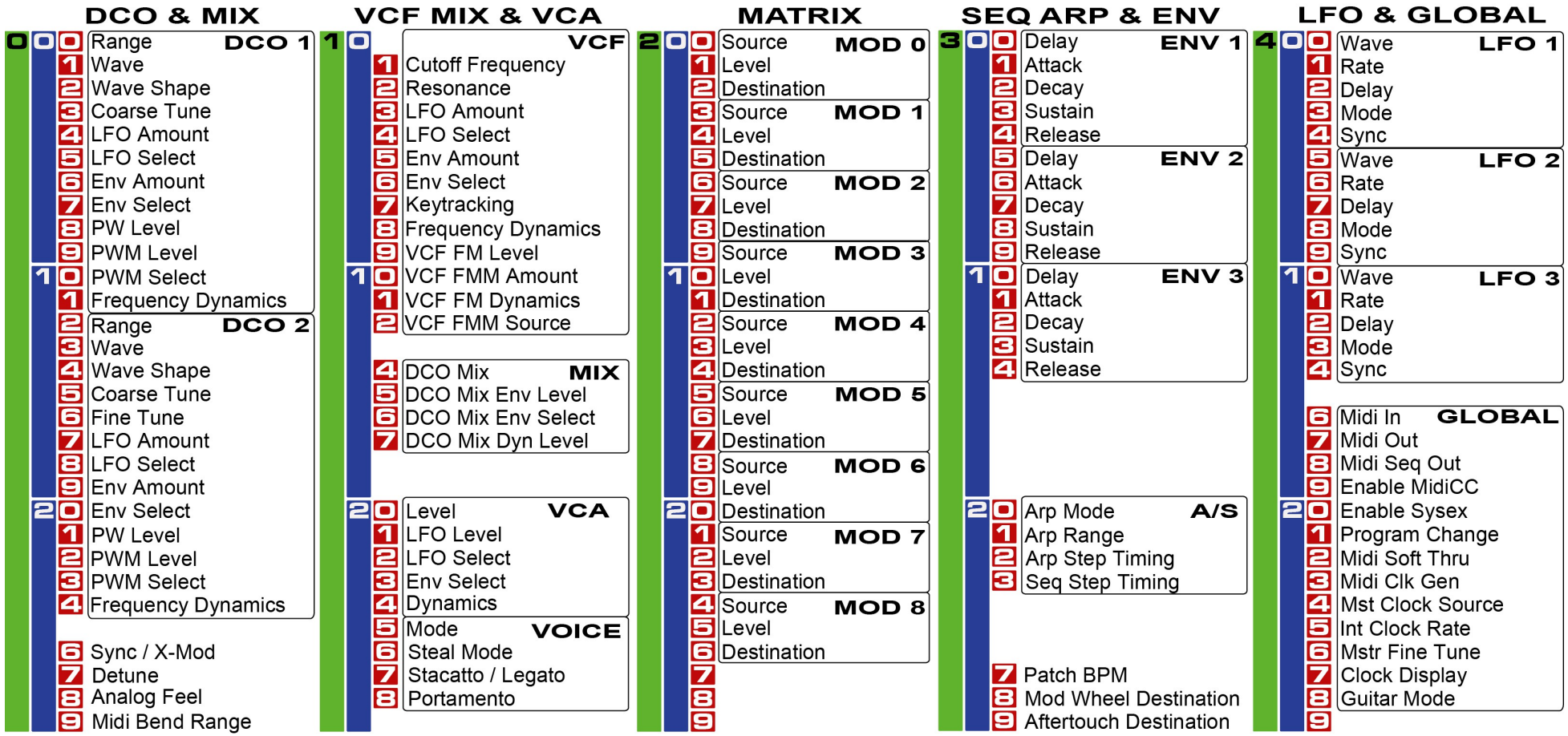


Kiwi 1000 Front Panel



Kiwi 1000 Parameter Edit Map

Kiwi-1000 v140 Edit Map



Front Panel Description

The Kiwi-1000 front panel differs from the original M-1000 and the Kiwi-1000 Upgrade redefines most of the buttons on the Oberheim M-1000. Many of the buttons have also been assigned new or multiple functions and others now operate differently. An overlay label is supplied with the upgrade that fits over the existing M-1000 front panel.

The new layout can be seen on the front panel layout on the previous pages.

On the Oberheim M-1000 is was not possible to edit parameters directly on the few tones that could be edited and all editing needed to be done via midi. This shortcoming has been overcome with the Kiwi-1000 upgrade and all parameters can be edited via the front panel. Because of the number of parameters in the Kiwi-1000 each parameter has a three button addressing system that looks like 113. These refer to the First, Second and Third buttons needed to select a parameter. See the parameter edit table on the previous page for details. An example would be 307 which is ENV2 Release Rate.

Most of the other buttons have also changed use and function and are described next in more detail.

KIWI-1000 BUTTONS

MODE BUTTON

The Kiwi-1000 has six modes of operation. The Mode the Kiwi-1000 is currently in is shown by the six Mode LEDs on the front panel.

A long press of the MODE Button will return the synth to the TONE Mode from any of the other Modes.

The six modes are

1 - TONE Mode.

Tone buttons 0-9 are used to select numbers for tones 000 to 999. The OPTION button is used to set and clear a Chord. The NEXT ('+') & PREV ('-') buttons will step to the Next & Previous Tones.

2 - ARP Mode

The 'OPTION' Button will start and stop the ARP playing.

Tone Button '7' sets Arp Mode
Tone Button '8' sets Arp Range

Button '9' starts Arp Division Edit Mode using the NEXT ('+') & PREV ('-') buttons. Press Button '9' again to exit the Arp Division Edit mode.

3 - SEQ Mode

The 'OPTION' Button will start and stop the Sequence playing.

The TONE buttons '0-7' will load the sequence stored under that number into the edit buffer.

A long press of the 'WRITE' button will enter Seq Edit Mode. Details about Seq Edit button use can be found in the Sequence section of the manual.

Button '9' starts Seq Division Edit Mode using the 'NEXT ('+') & PREV ('-') buttons. Press Button '9' again to exit the Seq Division Edit mode.

4 - DUMP Mode

Five different dumps are available.
1) TONE EDIT BUFFER. Button '0' followed by the 'WRITE' button will dump the TONE EDIT BUFFER.

NOTE - Any temporary edits will be lost. You should save any edited tones or Seqs before starting any dumps.

2) CURRENT GROUP. Tone Button '1' followed by the 'WRITE' button will dump the 100 tones in the current Group. This is a large dump.

3) SEQ EDIT BUFFER. Button '2' followed by the 'WRITE' button will dump the SEQ EDIT BUFFER.

4) ALL SEQ. Button '3' followed by the 'WRITE' button will dump ALL 8 SEQUENCES. This is a large dump.

5) GLOBAL PARAMETERS. Button '4' followed by the 'WRITE' button will dump the GLOBAL PARAMETERS.

5 - EDIT Mode

All Tone and Global parameters can be edited while in this mode. This is done by selecting the 3 digit parameter number from the parameter table and editing the value using the NEXT ('+') & PREV ('-') buttons. Holding down the NEXT or PREV buttons will scroll the value at a faster rate. If you are editing using midi the edits will also show on the display while in EDIT Mode.

6 - CLOCK

The Internal Master Clock rate can be set using the NEXT ('+') & PREV ('-') buttons. The range is from 5 to 299 BPM. The 'OPTION' button can be used to set a TAP TIMER while in this mode.

KIWI-1000 BUTTONS

OPTION BUTTON

The 'OPTION' button has different operations depending on the mode the Kiwi-1000 is currently in.

While in TONE Mode (TONE LED lit) the 'OPTION' button has two operations. A long press will change the Tone Set and a short press will act as a SET CHORD. If notes are playing when this is short pushed a Chord will be set. If no notes are playing the 'OPTION' is short pushed the Chord will be cleared.

There are two Sets of 1000 tones in the Kiwi-1000. These are called Set 0 and Set 1 and are changed by a long press of the OPTION button until the display reads "SE0" or "SE1".

The Set currently selected can be seen by the decimal points on the display. These are normal on Set 0 and inverted on Set 1.

When sending or receiving Midi Dumps these will always go to and from the current Set.

While in ARP Mode (ARP LED lit) the 'OPTION' button will start and stop the ARP playing. While the ARP is playing the ARP light will flash slowly.

While in SEQ Mode (SEQ LED lit) the 'OPTION' button will start and stop the SEQ playing. While the SEQ is playing the SEQ light will flash slowly. While in SEQ EDIT mode (WRITE pressed while in Seq mode) the SEQ LED will flash quickly and the Seq Step will display.

The 'OPTION' button is used as ABORT during SEQ EDIT, SEQ SAVE, SEQ ERASE or SYSEX DUMP.

During CLOCK MODE (CLOCK LED lit) the 'OPTION' button is used as a TAP TIMER to set clock speed.

KIWI-1000 BUTTONS

WRITE BUTTON

The 'WRITE' button has different operations depending on the mode the Kiwi-1000 is currently in.

The Oberheim M1000 has no hardware memory protection. As a partial protection we have made it that a long press of the Write button is required before a write to memory is permitted. Care must be taken not to override tones.

For writing a Tone to permanent memory in normal play mode (TONE LED is lit) long press 'WRITE' until the Group digit begins to flash then enter the Group, Bank and Tone number (000-999). The actual write to memory is done when the last digit is pressed.

A Tone can be easily copied from one location to another by selecting a different Tone number between the load and the save.

If you are editing a sequence then the editing can be finished by pressing the Write if you wish to save the seq edit to permanent memory. To save a sequence long press 'WRITE' (while in Seq Edit Mode) followed by Tone 0-7.

A short press of 'WRITE' button will also as a MIDI PANIC and will cancel any sounding notes.

When the K-1000 is in DUMP mode a long press of the 'WRITE' button is used to start a dump after the dump type has been selected using the '0-4' buttons.

The K-1000 supports loading dumps in from the following dump formats. Oberheim M-1000, Roland JX-8P, JX-10 & MKS-70, Kiwi-1000, Kiwi-8P & Kiwi-106 dumps. These will not always sound the same as they did on the various other synths though as both the hardware and tone processing is not the same..

To Calibrate the M1000 CEM chips press 'WRITE'+ '0' as you power on. This will take a few minutes to run.

KIWI-1000 BUTTONS

NEXT/PREV BUTTONS

The 'NEXT' (+) and 'PREV' (-) buttons have different operations depending on the mode the Kiwi-1000 is currently in.

TONE MODE

The 'NEXT' & 'PREV' buttons will step (and load) the current Tone up or down. i.e. if Tone #112 is playing tone #113 will load and sound if 'NEXT' is pressed.

The NEXT/PREV tone select will change the SET if PREV is pressed on Tone 000 or NEXT is pressed on Tone 999.

ARP MODE

The 'NEXT' & 'PREV' button will edit the ARP Step Timing if button '9' has been pressed while in ARP Mode. Press button '9' again to exit this mode.

SEQ MODE

The 'NEXT' & 'PREV' button will edit the SEQ Step Timing if button '9' has been pressed while in SEQ Mode. Press button '9' again to exit this mode.

EDIT MODE

The 'NEXT' & 'PREV' buttons will step the currently selected Tone or Global parameter value. The number of steps varies with each parameter and is detailed in the parameter details section. Holding down the button will scroll the value at a faster rate.

CLOCK MODE

The 'NEXT' & 'PREV' buttons will step the current CLOCK RATE. The range is 5 to 299 BPM. Holding down the button will scroll the value at a faster rate.

KIWI-1000 BUTTONS

BUTTONS '0' to '9'

The buttons '0-9' have different operations depending on the mode the Kiwi-1000 is currently in.

TONE MODE

The '0-9' buttons are used to select a Tone to Load. Tones have numbers starting at 000 and ending at 999. e.g. to load tone number 251 press '2' then '5' then '1'. There is no 'Bank Lock' mode in the K1000. Use the PREV & NEXT buttons or midi commands to quickly step between Tones.

EDIT MODE

The number buttons are used to select the parameter to edit. e.g. the number 001 will select the DCO1 Wave Shape parameter. The parameter numbers can be found on the edit map and the parameter edit section of the manual.

ARP MODE

The buttons '7-8' are used to set the ARP Mode & Range. Each press of the '7' or '8' button will cycle through the various options available.

The '9' button is used to edit the ARP clock division. To change the ARP Step Timing press '9', change the value using the 'NEXT' & 'PREV' buttons then press the '9' button again to exit this mode and return to ARP MODE.

Details on the button use while in ARP Mode are found in the ARP section of the manual.

SEQ MODE

The buttons '0-7' will load a sequence from memory to the seq edit buffer.

SEQ ERASE

The '8' button is used to Erase or Clear a sequence. While in SEQ MODE press '8' followed by the seq number '0-7' followed by a long press of the WRITE button.

SEQ CLOCK DIVISION

The '9' button is used to edit the SEQ clock division. To change the SEQ Step Timing press '9', change the value using the 'NEXT' & 'PREV' buttons then press the '9' button again to exit this mode and return to SEQ MODE.

SEQ EDIT MODE

The buttons '0-4' are used to create and edit a sequence. Details of sequence edit button use are in the Sequencer section of the manual.

DUMP MODE

The '0-4' buttons are used to select a dump type. The dump will not begin until a long press of the 'WRITE' button is made.

NOTE - Dumps in and out are always made to and from the currently selected Set.

Kiwi-1000 Upgrade Notes

Digital Oscillators

The M-1000 Synthesizer uses programmable dividers from two master oscillators to generate the pitch of the notes. While this does create a very stable pitch it does create some issues.

Because the dividers are being reprogrammed every time the pitch for that voice changes, the leading edge of the DCO pulse is constantly changing in relation to the other DCOs in the same and the other voices. This is a 'feature' of the M-1000 hardware and cannot be altered.

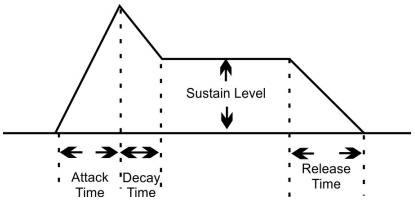
This is especially noticeable when playing in Unison or one of the Poly multiple voice modes as more than one voice is playing the same pitch but the start point of the voice waves will not be the same. The audible result of this is that random notes can sound 'thin' with much of the bass portion missing at certain start point combinations. Anything that effects the pitch of a voice (detune, analogue feel, pitch bending, lfo mod, Portamento etc) will change the DCO wave voice start points and change the sound.

Another 'feature' of this type of oscillator is with smooth changes between notes audible stepping will increase the higher the frequency. The reason for this is the change required in the divider ratio gets smaller as the frequencies get higher with fewer divider steps between notes.

This will be audible on LFO, Bend, portamento etc and the higher the frequency and the faster the change the worse the problem. This is a hardware problem and cannot be addressed.

The original M-1000 hardware had a single fixed master clock running the dividers for DCO1 and DCO2. This limits the range of the dividers to about 5 octaves. The Kiwi-1000 has expanded this so that there is one master clock for DCO1 and one for DCO2. Because these clocks are now generated within the upgrade cpu a much wider range is also possible. The DCO range now covers 64' to 2'. This is pushing the CEM3396 chips to their limits and the waveforms are not always true at the extreme ends of the ranges.

Portamento	Portamento is available in all playing modes. Portamento with the CEM3396 all in one synth voice chips is a little problematic. The chips require a control zone change at 500Hz to maintain wave shape across all frequencies. If the note is gliding past this point a small audio noise can be heard. While we have reduced this to the smallest amount possible and it is nearly inaudible it has not been possible to eliminate it completely. This is a 'feature' of the CEM3396 chip and is also present in the M-1000 if you listen for it.	
Display	The Kiwi-1000 display provides feedback and instructions that make navigating the menu easier. On normal play the display will show the Tone number.	The Internal Master Clock will blink the clock LED in time with the clock. As this can be annoying to some there is a Global Parameter to enable or disable the clock display.
Factory Presets	The factory presets are loaded via sysex files. The factory preset file is available from Kiwitechnics upon request and is included with the updates.	A Factory restore of the K-1000 is done by holding the 'WRITE' and the '9' buttons down while powering on the synth. **This will wipe all Tones (in both Sets) and Seqs in the synth and replace them with 'blank' Tones and Erased Seqs.**
Midi Received	Midi data received will flash the MIDI Led (the decimal point on the left most digit) if it is recognized by the Kiwi-1000.	
Midi Panic	A short press of the 'WRITE' button will act as a MIDI PANIC and will cancel any sounding notes.	To perform a WRITE you need to long press the WRITE Button.
Note Hold	The M-1000 has no Note Hold except when using a hold pedal and the Matrix. The TONE Led will flash when the midi hold command has been received.	The Kiwi1000 also uses the Matrix for note hold similarly to the M1000 as of version 1.4 and higher.

## Edit Buffer Compare	Whenever the edit buffer does not match the saved Tone showing on the display the right most decimal points on the display will flash.	To retain these changes when the Tone is changed or the Kiwi-1000 is powered off the Tone must be written to memory. This is done by a long press of the Write button. This is followed by the Group, Bank & Tone numbers entered using the buttons 0-9. The Tone is written to memory on the last number press which allows a Tone to be moved and written to any location in memory.
## LFO Generators	The Kiwi-1000 has 3 independent LFO generators. These each have 7 waveforms and can be free running or sync'd with the master clock with a divider. Each LFO has it's own sync divider with 16 possible divide ratios. LFO 1 & 2 will continue to free run when a new note is pressed after all notes were lifted. LFO 3 will restart its wave to a first note played after all notes lifted. When LFO's are running as sync'd they need 2-3 cycles of the clock to correctly measure the current rate and generate a sync'd rate. Until this is measured the LFO will not run correctly. This can take a few seconds with a slow master clock and/or long division times.	Each LFO can be Normal or Plus mode. Normal will move the base above and below the normal parameter level and plus mode will only move the base level up. Each section of the Kiwi-1000 that uses LFO input can select from one of the 3 LFOs. The Mode called FAST RANDOM will generate a random output 256 times faster than the normal RANDOM mode. This is a little experimental and limited by the Oberheim hardware response time but should allow the LFO to act as a pseudo noise source. Modes are 1) Sine Wave 2) Triangle Wave 3) Saw Wave 4) Reverse Saw Wave 5) Square Wave 6) Random 7) Fast Random
## Envelopes	The Kiwi-1000 has three independent Envelope Generators. The Envelopes generated are also available as Matrix sources. Envelopes 1-3 are the traditional ADSR type. As of version 1.4 there is also a start delay so they are now 5 stage DADSR.	

Write Protect	Because the M-1000 has no hardware write protect care must be exercised when writing Tones or Seq to memory. **Care must be taken when dumping Tones into the K1000. Dumped tone will overwrite existing tones with no warning. Tones being dumped into the K1000 will attempt to use the Tone number stored in the dump so a tone may not go where you expect it to.** **It is strongly recommended to backup existing tones before making any tone dumps into the K1000.**	To prevent accidental writes the WRITE button must be pressed with a longer press to enter Write mode for Tones and Seqs.

Sequencer

The Kiwi-1000 Upgrade contains a polyphonic 6 track sequencer that has the capacity of 124 step automatic playing.

The clock for the Sequencer is always the Master Clock and this can be divided by one of 13 different ratios including swing options. The Seq Clock Divide parameter is 322 and can also be edited by pressing the '9' button while in SEQ MODE.

Note - If the Master clock source is set to the Midi Clock and no midi clock is present the Sequencer will not run.

```
1=Half Note
2=Quarter note
3=8th note
4=8th note, half swing
5=8th note, full swing
6=8th note triplets
7=16th note
8=16th note, half swing
9=16th note, full swing
10=16th note triplets
11=32nd note
12=32nd note triplets
13=64th note triplets
```

SEQ SELECT

While in SEQ MODE a Tone button '0-7' can be used to select and load a sequence.
There are 8 Sequence memories and only one of these can be selected at a time. If a new sequence is loaded while one is playing the playing one will finish before the new one will take effect.

SEQ EDIT

A long press of the 'WRITE' button will enter sequence edit mode (see the sequence edit section)

SEQ STEP TIMING

Pressing button '9' while in SEQ MODE is a shortcut to editing parameter 322 Seq Step Timing. The step timing is changed using the 'NEXT' and 'PREV' button. Press '9' again to exit this mode.

SEQ ERASE

To Erase a Sequence press the Button '8' while in SEQ MODE. This will need to be followed by the Sequence number and the 'WRITE' button to perform the erase.

This button followed by a tone button 0-7 followed by the WRITE button will blank a sequence

Sequencer Writing / Editing

The way to erase or blank a sequence is by doing the following.

While in SEQ MODE press the '8' button. Next press the Tone button '0-7' corresponding to the sequence you wish to clear. Follow this with a long press of the 'WRITE' button which will do the clearing. At any stage before the write pressing the 'OPTION' button will cancel the sequence clear and return you to SEQ MODE. A sequence clear is equivalent to writing 124 Rests and setting the length to 1.

To start editing or creating a sequence long press 'WRITE' while in SEQ MODE. **If a sequence contains data when 'WRITE' is pressed then any step(s) you write will overwrite all notes in the existing step(s) already in the sequence.** The 'PREV' (backwards) and 'NEXT' (forwards) buttons will allow non destructive stepping within a sequence. Any notes played will always write the next step in the sequence. This way the sequence will auto lengthen as notes are played.

e.g. if the existing sequence is C, D, E, F, G in 5 steps and you step to the second step (D sounds) and play the chord C E G the resulting sequence will now be C, D, CEG(chord), F, G. You will have overwritten the third step.

You can write the pitch by playing the midi notes, and the rhythm by pressing the Tie button and the Rest button. Note levels are also saved. This will allow notes to be accented.

(1) Find the shortest time value in the phrase you wish to write. Then divide the longer time values by that shortest one.
(e.g)

2) Long press the 'WRITE' button to begin Seq write/edit.

(3) By playing the notes and using the Tie button and Rest buttons, write steps one after another.

Note - if more than 6 notes are used in one step only the last 6 notes used will play and be stored.

(4) If writing is complete long press the 'WRITE' button followed by a Tone button (0-7) to Save the Sequence to permanent memory or the 'OPTION' Button to exit edit mode. The next press of the 'OPTION' button will start the sequence playing on the next clock received. If the Seq is not written to memory the sequence will be lost if the Kiwi-1000 is powered off or another sequence is loaded. Pressing the 'OPTION' button again will stop the sequence playing (refer to **Sequencer Playing** in the next section).

When a sequence is playing the seq LED will flash and the current step will display of the digit display while in SEQ MODE.

Sequencer Writing / Editing

Button use in detail while in SEQ EDIT MODE

Button '0' – Rest

When the Button '0' is pressed while in edit mode a blank step will be inserted at the next sequence step.

Note - this button can only be used if no notes are being pressed. If notes are pressed this button will be ignored.

Button '1' – Tie

When the Button '1' is pressed while in edit mode a tied step will be inserted at the current step.

Note - this button can only be used if no notes are being pressed. If notes are pressed this button will be ignored.

Note – A tie can only follow a sequence step that contains note data. Therefore it cannot be placed after a rest or at the first step in a sequence. If these conditions are not met the button will be ignored.

Button 'PREV' – Step Back

When the 'PREV' button is pressed while in edit mode the sequence will step back one position if possible and sound the step.

Button 'NEXT' – Step Forward

When the 'NEXT' button is pressed while in edit mode the sequence will step forward one position if possible and sound the step.

Button '2' – Set Length

When the Button '2' is pressed the sequence length will be set to the current step.

e.g. if the sequence is A,B,C,D,E in five steps and you put the current position to the 3rd step (Note C) using the PREV and NEXT buttons and then press the '2' the sequence will now be A, B, C only.

Button '3' – Insert Step

When the '3' button is pressed while in edit mode and notes are being played a step is inserted after the current step that is being displayed.

Note – if the sequence is full (124 steps) the last step will be lost when the '3' button is pressed.

Note – if no notes are being played a blank step (Rest) will be inserted.

Button '4' – Delete Step

When the '4' button is pressed while in edit mode the sequence step that is showing on the display is deleted and all steps after this point are moved up one position.

C) Playing

Load Sequence

A Sequence can be loaded into memory while in SEQ MODE but pressing one of the 8 Tone buttons '0-7'. The Sequence that is stored under the Tone button selected will be loaded to memory

If you press the 'OPTION' button while in SEQ MODE the SEQ Led will flash and the data written into the sequencer will be played. The first note of the sequence will only sound once a clock has been received. This allows a seq to be queued to start. When all the notes are played the data will return to the beginning and be played again from the start. Pressing the 'OPTION' button once more will stop the sequence playing immediately. The tempo of the playing will be determined by the clock source. If the clock source is the Internal Clock then the tempo will be set by the Master Clock which can be further divided using the SEQ STEP TIMING button.

Settings made in the Sequence Control parameters will effect Sequence playback.

317 - Oneshot (0=Loop,1=play once & stop)
318 - KeyPlayDown (0=Seq always plays when enabled,1=Only plays when enabled & key is down)
319 - AutoTranspose (0=actual seq notes, 1=transpose last played)
320 - AutoTransposeReset (0=Continue seq in new transpose, 1=reset seq to step 1 on new transpose value)
321 - AutoComplete (0=Sudden Death,1=All keys up stops seq)

It is possible to play along with the sequencer. The Kiwi-1000 has 6 voices in total and if not enough voices remain for all the sequence note(s) then notes will be lost according to the steal rules that have been specified in parameter 126 (Voice Steal Mode). i.e. if the sequence step has four notes and three are being played then one note will not sound.

Note - If a new sequence or Tone is loaded while a sequence is playing the load of the Tone and Seq will delay until the current sequence reaches the end and is about to loop back to the start. At this point the Tone and Sequence (if auto load enabled) will then load and the next note(s) to sound will be with the new selection. If the new Tone does not have a sequence running when it is saved the sequence that is running will stop.

Note - If the Master clock source is set to the Midi Clock the Sequence will not play if the midi clock is not present.

Arpeggiator

The KiwiTechnics Kiwi-1000 Upgrade has a built in Arpeggiator that can be applied to any sound.

Arpeggiator Mode is started and stopped by pressing the 'OPTION' Button while in ARP MODE.

The ARP indicator will flash when the ARP is playing.

The clock for the Arpeggiator is always the Master Clock and this can be divided using Patch Parameter 315 Edit. There are 13 different ratios including swing options. The Arp Clock Source parameter is located under 315 or by using the '9' button and the 'NEXT'/'PREV' buttons while in ARP MODE.

```
1=Half Note
2=Quarter note
3=8th note
4=8th note, half swing
5=8th note, full swing
6=8th note triplets
7=16th note
8=16th note, half swing
9=16th note, full swing
10=16th note triplets
11=32nd note
12=32nd note triplets
13=64th note triplets
```

The behavior or the Arpeggiator can be set using the ARP MODE ('7') & ARP RANGE ('8') buttons. The ARP MODE will set the style and will cycle through UP only, DOWN only, UP & DOWN, RANDOM and AS PLAYED. The OCTAVE RANGE button will cycle through the range which can be 1, 2, 3 or 4 octaves. These are saved with the Tone.

Note - If the Master clock source is set to the Midi Clock the Arp will not play if the midi clock is not present.

Note – The Arp settings are saved with the Tone. i.e. if the Arp is on when the Tone is saved it will be on when the Tone is loaded

Canceling Arpeggiator Mode.
Arpeggiator mode can be stopped by pressing the 'OPTION' button while in ARP MODE. The light on the ARP button will stop flashing.

Note - If the Arpeggiator notes held are spread over more than 1 octave and more than one octave is selected in the Arp Range the notes played will be as follows. All the first octave notes held will play followed by the same pattern moved up one, two or three octaves. The result of this will be the first note of the second pass can be lower than the last note of the first pass. This can sound odd if you have selected one direction for the Arp Mode.

Chord Mode

	A Chord is set in TONE MODE by playing the Chord and then pressing and releasing the OPTION Button while the keys of the chord are being held. The chord that is set will then play for each key pressed as the base note. Note - it is best to set the chord using middle 'C' as the base note. When a Chord is set the center digit decimal point will flash.	As only one chord can be played at a time the keys played have last note priority. **Changing a chord.** To change a chord play the new chord and press and release the OPTION Button while the chord keys are pressed. **Canceling Chord Mode.** To cancel chord mode press and release the OPTION Button in TONE MODE with no notes pressed.

Parameter Editing

	Parameter Editing can be done in two ways. Using midi or using the front panel. Midi details can be found in the midi section of this manual.	Parameter numbers are all three digits and will look like 101 for VCF Cutoff for example. To edit this parameter press PARAMETER EDIT, Button '1' then Button '0' then Button '1'. Then edit the value using the 'NEXT' & 'PREV' buttons. Holding down the Next or Prev buttons will speed up the changes.
DCO Parameters	000 – DCO 1 Range 012 – DCO 2 Range	Options are 64', 32',16', 8', 4' or 2'
	001 – DCO 1 Wave 013 – DCO 2 Wave	Options are Saw/Tri, Pulse or a combination of Pulse & Saw/Tri, DCO2 only can have Noise as a source
	002 - DCO 1 Wave Shape 014 - DCO 2 Wave Shape	If Saw/Tri is selected this parameter will alter the wave shape
	003 – DCO 1 Course Tune 015 – DCO 2 Course Tune	Range is ± 1 Octave in half tone steps
	016 – DCO 2 Fine Tune	Range is ± 50 Cents
	004 – DCO 1 LFO Amount 017 – DCO 2 LFO Amount	Range is -63 -> +63
	005 – DCO 1 LFO Select 018 – DCO 2 LFO Select	Options are LFO1, 2 or 3
	006 – DCO 1 ENV Amount 019 – DCO 2 ENV Amount	Range is -63 -> +63
	007 – DCO 1 ENV Select 020 – DCO 2 ENV Select	Options are ENV1,2 or 3
	008 - DCO 1 PW Level 021 - DCO 2 PW Level	Range is 0-127. This will only have effect if Pulse Wave is selected
	009 - DCO 1 PWM Level 022 - DCO 2 PWM Level	Range is 0-127. This will only have effect if Pulse Wave is selected
	010 - DCO 1 PWM Select 023 - DCO 2 PWM Select	Options are ENV1, ENV3, LFO1, LFO2 Range is 0-127
	011 – DCO 1 ENV Dynamics 024 – DCO 2 ENV Dynamics	Key velocity effects DCO Env Amount.
	114 – DCO 1/2 Mix	Range is 0-127. 0 is DCO1 only
	115 – DCO Mix Envelope Level	Range is -63 -> +63
	116 – DCO Mix Select	Options are ENV1,2,3 or LFO1,2,3
	117 – DCO Mix Dynamics Level	Range is 0-127 Key velocity effects Mix Env Amount
	026 – X Mod	Options are Off, Sync 1, Sync 2, XMod
	027 - DCO Detune	Range is 0-127
	028 - Analog Feel	Range is 0-127
	029 – Midi Bend Range	Range is 0-127 (127=1 Oct)

VCF Parameters	101 – VCF Cutoff 102 – VCF Resonance 103 – VCF LFO 104 – VCF LFO Select 105 – VCF Envelope Level 106 – VCF Envelope Select 107 – VCF Key 108 – VCF Dynamics 109 – VCF FM Level 110 – VCF FMM Amount 111 – VCF FMM Dynamics 112 – VCF FMM Source	Range is 0-127 Range is 0-127 Range is -63 -> +63 Options are LFO1, 2 or 3 Range is -63 -> +63 Options are ENV1,2 or 3 Range is 0-127 Range is 0-127 Range is 0-127 Range is 0-127 Range is 0-127 Options are Env 1,2,3, (normal or inverted), LFO1, 2 or 3
LFO Parameters	400 – LFO 1 Wave 401 – LFO 1 Rate 402 – LFO 1 Delay 403 – LFO 1 Mode 404 – LFO 1 Sync 405 – LFO 2 Wave 406 – LFO 2 Rate 407 – LFO 2 Delay 408 – LFO 2 Mode 409 – LFO 2 Sync 410 – LFO 3 Wave 411 – LFO 3 Rate 412 – LFO 3 Delay 413 – LFO 3 Mode 414 – LFO 3 Sync	Options are 1=Sine, 2=Triangle, 3=Square, 4=Saw, 5=Rev Saw, 6=Random, 7=Fast Random Range is 0-127 Range is 0-127 Options are Normal or Plus Normal will raise and lower parameter being edited and Plus will only raise the parameter being edited 0=Free Running 1=Four Notes (384 Clocks/Step) 2=Two Notes (192 Clocks/Step) 3=Whole Note (96 Clocks/Step) 4=Half Note (48 Clocks/Step) 5=Quarter note (24 Clocks/Step) 6=8th note (12 Clocks/Step) 7=8th note triplets (8 Clocks/Step) 8=16th note (6 Clocks/Step) 9=16th note triplets (4 Clocks/Step) 10=32nd note (3 Clocks/Step) 11=32nd note triplets (2 Clocks/Step) 12=64th note triplets (1 Clocks/Step) Options are 1=Sine, 2=Triangle, 3=Square, 4=Saw, 5=Rev Saw, 6=Random, 7=Fast Random Range is 0-127 Range is 0-127 Options are Normal or Plus Options are the same as LFO1 Options are 1=Sine, 2=Triangle, 3=Square, 4=Saw, 5=Rev Saw, 6=Random, 7=Fast Random Range is 0-127 Range is 0-127 Options are Normal or Plus Options are the same as LFO1

Modulation Matrix	200 – Matrix 1 Source 203 – Matrix 2 Source 206 – Matrix 3 Source 209 – Matrix 4 Source 212 – Matrix 5 Source 215 – Matrix 6 Source 218 – Matrix 7 Source 221 – Matrix 8 Source 224 – Matrix 9 Source	Matrix Source options are 0=Off 1=Bend Up 2=Bend Down 3=Bend Full 4=Midi Mod Wheel 5=Key Velocity 6=Key Note 7=LFO1 (bipolar) 8=LFO1 (unipolar) 9=LFO2 (bipolar) 10=LFO2 (unipolar) 11=LFO3 (bipolar) 12=LFO3 (unipolar) 13=ENV1 14=ENV2 15=ENV3 16=MidiCC#1 17=MidiCC#2 18=MidiCC#3 19=MidiCC#4 20=MidiCC#5 21=MidiCC#6 22=Midi Channel After Touch 23=Midi Note After Touch 24=Midi Key Gate 25=Midi Hold Pedal
	201 – Matrix 1 Level 204 – Matrix 2 Level 207 – Matrix 3 Level 210 – Matrix 4 Level 213 – Matrix 5 Level 216 – Matrix 6 Level 219 – Matrix 7 Level 222 – Matrix 8 Level 225 – Matrix 9 Level	Range is -63 -> +63

	202 – Matrix 1 Destination 205 – Matrix 2 Destination 208 – Matrix 3 Destination 211 – Matrix 4 Destination 214 – Matrix 5 Destination 217 – Matrix 6 Destination 220 – Matrix 7 Destination 223 – Matrix 8 Destination 226 – Matrix 9 Destination	Matrix Destination options are 0=Off 1=DCO1 Freq 2=DCO2 Freq 3=All DCO Freq 4=DCO1 Range 5=DCO1 Wave 6=DCO1 WS 7=DCO1 PW 8=DCO1 PWM 9=DCO2 Range 10=DCO2 Wave 11=DCO2 WS 12=DCO2 PW 13=DCO2 PWM 14=DCO Mix 15=Detune amount 16=VCF Cutoff 17=VCF Resonance 18=VCF FM 19=VCF FMM 20=VCA Exp Level 21=VCA Lin Level 22=Port Rate 23=LFO1 Rate 24=LFO2 Rate 25=LFO3 Rate 26=ENV1 Attack Rate 27=ENV1 Decay Rate 28=ENV1 Release Rate 29=ENV2 Attack Rate 30=ENV2 Decay Rate 31=ENV2 Release Rate 32=ENV3 Attack Rate 33=ENV3 Decay Rate 34=ENV3 Release Rate
VCA Linear Level	119 VCA Linear Level	Range 0-127
VCA Exp Level	120 VCA Exponential Level	Range 0-127
VCA LFO Level	121 VCA LFO Level	Range -63 -> +63
VCA LFO Select	122 VCA LFO Select	Options are LFO 1-3 Normal or Inverted
VCA ENV Select	123 VCA ENV Select	Options are Gate, ENV 1, 2 or 3
VCA Dynamics	124 VCA Dynamics Level	Range 0-127

Voice Mode	125 Voice Key Mode	Voice Key Mode selects the way the 6 playing voices are assigned to notes played Options are Poly Single – 6 notes trigger 6 voices Poly Dual – 3 notes (max) trigger 2 voices each Poly Triple – 2 notes (max) trigger 3 voices each Unison – the last note played will trigger 6 voices Solo – The last note played will trigger 1 voice
Voice Mode Steal	126 Voice Mode Steal	When more than 6 notes are played and Poly Chain is set to Off a voice can be optionally stolen depending on the selection made here Options are Oldest – The oldest voice is selected (this is the default) Off – No voice is stolen (7th note is ignored) Newest – The last note played is selected Highest – The note with the highest pitch is selected Lowest - The note with the lowest pitch is selected Quietest – The note with the lowest volume is selected. Note – If Voice Assign mode is Unison or Solo or Chord Mode or Arp are on then voices are not Stolen and this option is disabled
Voice Mode Staccato	127 Voice Mode Staccato	Options are Staccato/Legato When staccato is selected every new note will trigger a new envelope attack stage. When legato is selected a new envelope attack stage will only be triggered after all notes are lifted. Note - in the initial release Dual & Triple Legato is disabled.
Detune	027 DCO Detune	Range 0-127. DCO Detune will have no effect on Solo keying
Analogue Feel	028 Analogue Feel	This parameter injects a very subtle random tune adjusts to each note. This is changed each time a note is played.

SEQ Step Timing	322 Seq Step Timing	The Seq Clock Timing can be set to 1 of 13 options. These are: 1=Half Note (48 Clocks/Step) 2=Quarter note (24 Clocks/Step) 3=8th note (12 Clocks/Step) 4=8th note, half swing (14,10 Clocks/Step) 5=8th note, full swing (16,8 Clocks/Step) 6=8th note triplets (8 Clocks/Step) 7=16th note (6 Clocks/Step) 8=16th note, half swing (7,5 Clocks/Step) 9=16th note, full swing (8,4 Clocks/Step) 10=16th note triplets (4 Clocks/Step) 11=32nd note (3 Clocks/Step) 12=32nd note triplets (2 Clocks/Step) 13=64th note triplets (1 Clocks/Step)
Patch Clock	327 Patch Clock	If this parameter is set to non zero this setting will override the Master Clock Rate while the Tone is loaded. If this parameter is set to zero the Master Clock Rate will be used. Range is 1-127 which is 6-299 BPM
ARP Mode	313 Arp Mode	The ARP MODE options are UP only DOWN only UP & DOWN RANDOM AS PLAYED
ARP Range	314 Arp Range	The ARP Range options are 1-4 Octaves
ARP Step Timing	315 Arp Step Timing	The Arp Clock Timing can be set to 1 of 13 options. These are: 1=Half Note (48 Clocks/Step) 2=Quarter note (24 Clocks/Step) 3=8th note (12 Clocks/Step) 4=8th note, half swing (14,10 Clocks/Step) 5=8th note, full swing (16,8 Clocks/Step) 6=8th note triplets (8 Clocks/Step) 7=16th note (6 Clocks/Step) 8=16th note, half swing (7,5 Clocks/Step) 9=16th note, full swing (8,4 Clocks/Step) 10=16th note triplets (4 Clocks/Step) 11=32nd note (3 Clocks/Step) 12=32nd note triplets (2 Clocks/Step) 13=64th note triplets (1 Clocks/Step)
ENV ADSR	300 – 304 Env 1 DADSR 305 – 309 Env 2 DADSR 310 – 314 Env 3 DADSR	Range is 0-127
GLOBAL PARAMETERS		
Midi In Channel	416 Midi In Channel	Range is 1-16 or 17=Omni

Midi Out Channel	417 Midi Out Channel	Range is 1-16
Seq Midi Out Channel	418 Seq Midi Out Channel	Range is 1-16
Enable MidiCC	419 Enable MidiCC	Options are Off – No Midi CC Send or Recv 1 – Input Only 2 – Output Only 3 – Both Input and Output
Enable Midi Sysex	420 Enable Midi Sysex	Options are Off – No Midi Sysex On – Sysex Receive Enabled
Enable Program Change	421 Enable Program Change	Options are Off – No Program Change On – Midi Program Change Enabled
Midi Soft Through	422 Midi Soft Through	Options are Off – Stop All 1 – Pass All 2 – Pass Only nonCC 3 – Stop Only used MidiCC
Midi Clock Gen	423 Midi Clock Generation	Options are Off, On The Kiwi-1000 will output a midi clock which is set by the internal clock rate when this parameter is set On
Master Clock Source	424 Master Clock Source	Options are Internal or Midi. Note – If midi is selected and there is no midi clock present then Arp, Seq or Sync'd LFOs will not run
Master Clock Rate	425 Master Clock Rate	Range is 0-127 which is 5-299 BPM
Master Fine Tune	426 Master Fine Tune	Range is 0-127 64=A440
Clock Display	427 Clock Display	Options are Off – No clock pulse is displayed on the front panel On – Master Clock will pulse the CLOCK LED on the front panel While in ARP or SEQ modes the clock light will show the ARP & SEQ divided rates
Guitar Mode	428 Guitar Mode	Options are Off, On When Guitar Mode is switched on the voices will respond to midi channels 1-6 for voices 1-6.

Tone Dump Importing

Tone Dump Imports	The Kiwitechnics K1000 upgrade is capable of loading in Oberheim M1000, Kiwi106, Kiwi8P, Roland JX-8P and Roland JX-10/MKS-70 tones via midi. This is achieved by playing the sysex dump into the K1000. There are some caviates though. Because the tone layout and sound generation in the K1000 is completely redesigned it is not really possible to get all the parameters behaving exactly as they did in the M1000. Because of this it is not possible to get the tones sounding the same by a simple conversion and each tone will need to be edited. The main differences is the extensive use of the matrix in the M1000 for common parameters whereas the Kiwi products use dedicated parameters for these and leave the matrix system for the more unusual. We have converted what we can but do not expect miracles. Some OB M1000 tone dumps contain names that are in the form 'BNKx: yz'. When these are encounted the tone will be stored in the y bank (0-9) and z tone (0-9). The Group is ignored and non kiwi1000 dumps are always put into the currently selected Group. Other OB tone dumps have random invalid characters in the tone name area. Therefore make sure you have selected the Group that you want the dump to be saved into BEFORE you start the dump into the K1000.	Other supported tone formats are more like the K1000 tone format and sound generation system and will more closely match the original tone. WARNING - Tones dumps have to ability to quickly overwrite large numbers of existing tones. WARNING – K1000 Tone Dumps will attempt to put themselves into the same position that they were saved from. If you are importing tones from a different synth they will always save to the currently selected Group but may not always end up where you expect them to go. **Make sure you have tones you wish to keep backed up before importing tone dumps.**

Setting up with External Devices

Midi Bend

We have found during our testing that midi keyboards do not always handle the midi bend commands well. Some brands are more steppy than others which will give the bend small jumps and this is audible. The faster the bend is moved and the larger the range the more this can be heard.

There is also the problem mentioned in the digital oscillator discussion under the K1000 Upgrade Notes with the DCO frequency dividers getting audible steps as the frequencies get higher.

None of this is a problem though when the Bend Range parameter is turned down for small bend ranges.

Midi Notes

Midi through should be used if multiple units are being used on the midi chain to reduce delays. While every effort has been made to make the midi as fast as is possible within the KiwiTechnics Kiwi-1000 Upgrade there will always be small delays between the midi input and midi output as the full command needs to be received and interpreted before it can be processed.

Full midi command details are at the end of the manual.

Hold Pedal

Midi Hold is achieved by using the matrix. Use the Midi Hold matrix source and set the destination to increase the envelope release time.

Firmware Updates

	Firmware Updates The Kiwi-1000 is put into update mode by pressing and holding the MODE button as the Kiwi-1000 is powered on. The update file can then be played into the Midi In port. As the files are playing into the Kiwi-1000 the Leds will cycle. If the update has no errors then ' gd' will display. If there was an error then 'Err' will display and the update should be retried. Note – If the LEDs show 'Err' there was an error during the update and you should retry the update. If the Program file should stop mid send this is normally the PC midi hardware not coping with the file size. Try slowing the send or use a different brand of midi interface.	Note – During update all activity in the voice board is stopped. This can cause random noise to sound out the output as the MUX is no longer being updated and this can get quite loud. It is recommended to turn down the volume during this process.

Calibration Mode

Calibration Mode

The Kiwi-1000 is put into Calibration mode by pressing and holding the WRITE and '0' buttons at the same time as the Kiwi-1000 is powered on.

Note – Warm up the M1000 for 30mins to stabilize the audio path electronics before running the Calibration.

The CEM3396 'Synth in a chip' ICs used in the M1000 can vary in a number of ways and the calibration option tries to even these out so that all voices will have a similar sound.

The CEM3396s are trimmed for Waveshape, volume, filter resonance start point and filter tuning. This will take about 1-2 minutes / voice.
This only needs to be run once at install and when a CEM chip is replaced.

After the calibration any bad voices will display on the front panel LEDs as a flashing light. The right most light is voice 1 and this is the same position that the CEM chip is inside the M1000.

MODE	= Voice 6
ARP	= Voice 5
SEQ	= Voice 4
EDIT MODE	= Voice 3
DUMP	= Voice 2
GLOBAL	= Voice 1

The K1000 will still run after a power off and any bad voice(s) will be out of calibration.

If bad voices are found the CAL should be run again to confirm.

Upgrade install

Disclaimer.

This modification is at your own risk and Kiwitechnics will not be held liable for any damage done by not doing this modification correctly.

If you are in any doubt at all or do not understand any part of this document then have this work done by a professional.

The KiwiTechnics Kiwi-1000 Upgrade must be installed by a competent technician with the correct tools or damage to your Kiwi-1000 can occur.

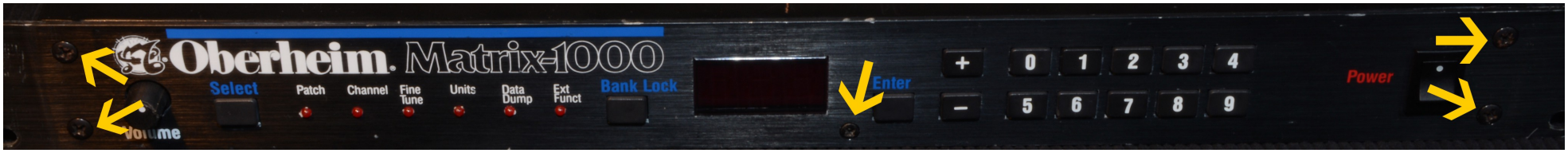
UNPLUG THE M-1000!

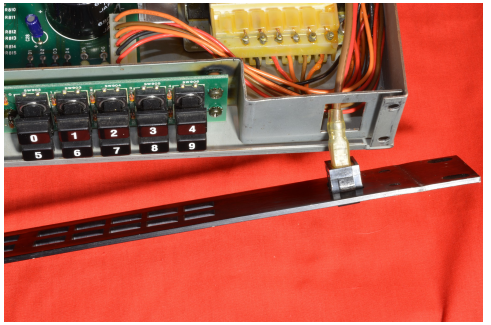
There are dangerous voltages inside the unit and it must not be opened until the power plug is removed from the power supply.

One 40 pin, one 24 pin and one 14 pin chip need to be removed and replaced with a 40 pin socket and some links which are supplied with the KiwiTechnics Kiwi-1000 Upgrade. These instructions are supplied as a guide for your technician only and it is your responsibility to have this done professionally. This can take up to 60 mins depending on your skill level.

Step 1) Opening the M-1000 – Remove the top cover by removing the 3 screws on each side of the top cover and the 3 screws on the rear. There are 9 screws in total. The cover and screws can then be put to one side.

Step 2) Remove the front panel. This involves removing the 2 screws at each end and the one screw in the middle. There are 5 in total and are marked in the photo. The Power switch has two wires that are connected to the switch with press on connectors. Remove these and put the panel & 5 screws to one side.

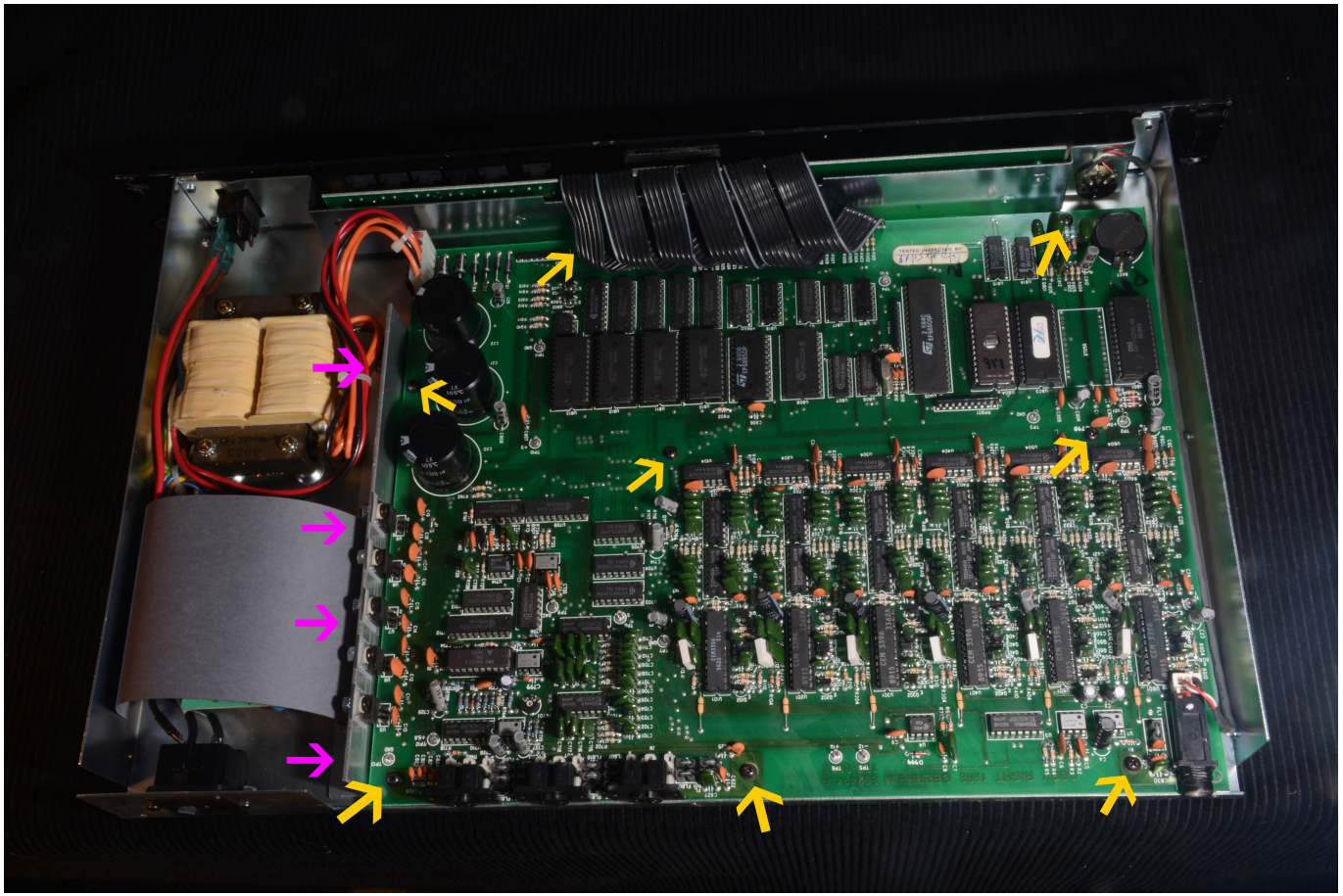


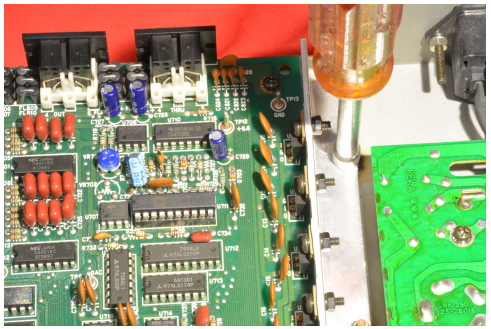


Step 3) Remove the main board & front panel board as a single unit. **The black connecting wires between the front panel board and the main board will very easily break if bent and flexed. Care must be taken when removing the two boards and working on the main board to keep these cables as immobile as possible.** If these do break it is better to add an extra wire than try to fix the existing one as this is not simple with the plastic covering the wires. They will almost always break at the point where they exit the plastic covering with no wire left to solder onto.

Unplug the 6 pin power connector from the transformer.

Remove the 8 black screws on the Main board marked in yellow in the photo and the 4 nuts holding the heatsink (marked in Purple) to the chassis of the M-1000.
The main board & front panel assembly should now be able to be lifted from the M-1000 as a single unit.





Step 4) Desolder the listed ICs and fit the supplied 40 pin IC socket and links.

It is very important that this step is done correctly.

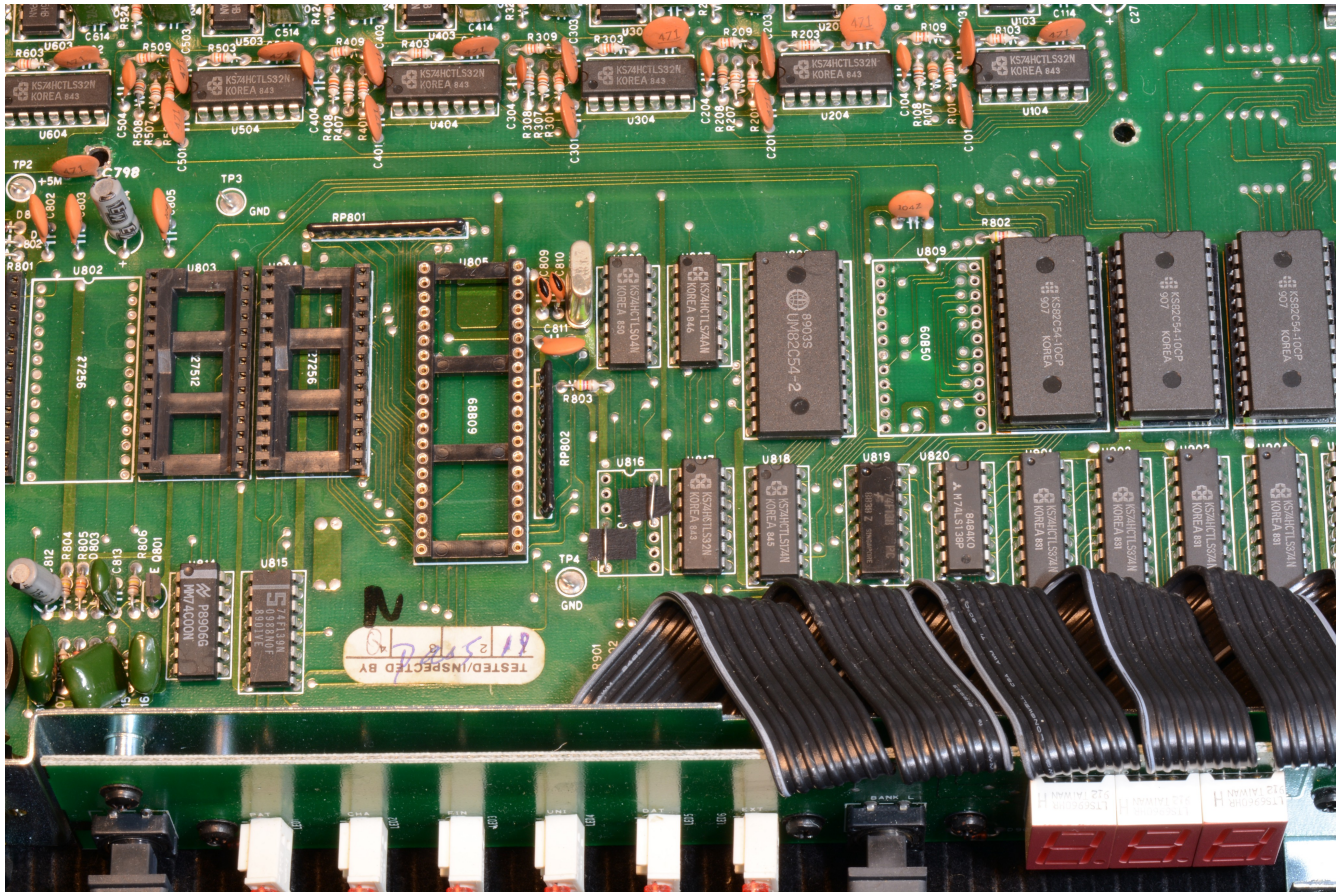
On the top side of the voice board underneath the ICs (Integrated Circuits) that need to be removed are some fine tracks that will be damaged and difficult to repair if all the solder is not removed correctly.

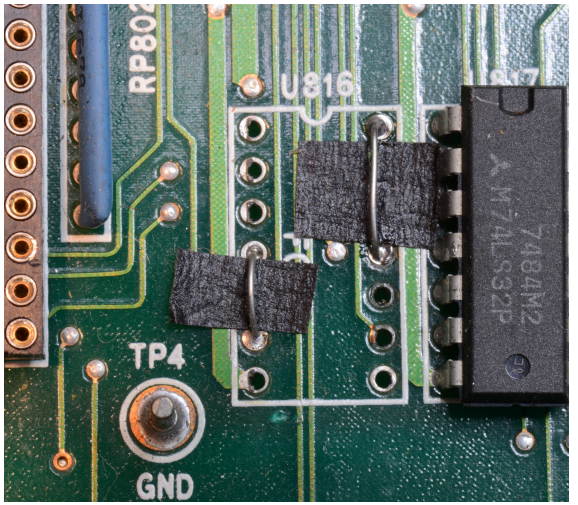
All the solder must be removed from all the 40 & 24 holes in the large ICs and the 16 holes in the small IC and the pins free of the hole edges before the ICs are lifted out of the board.

All the ICs pins should be able to move freely in the holes which shows that they are not still soldered to the hole sides. The best way to achieve this is with a good vacuum desoldering tool. A combination of a quality Solderwick and a hand vacuum can be used but you will need to take care as these can cause damage to the board. The copper used in these older circuit boards is very soft at 300+ degrees and is very easily lifted from the surface. A hand vacuum tool will jump and can damage tracks as it is triggered. If tracks are damaged they will need to be repaired before proceeding to the next step. The best way to do this is with a fine enameled copper wire which is the same as is used to wind transformers or chokes and can be found in most electronics parts stores. If the solder cannot be fully removed a good idea is to resolder the joint and try again. Fresh solder is easier to remove.

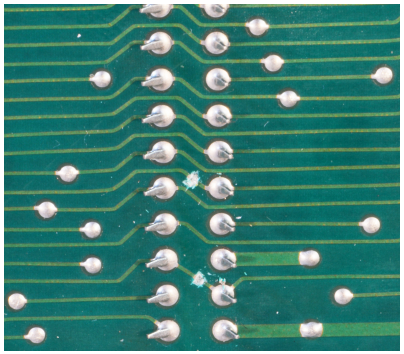
The following ICs and parts need to be removed. IC805 (40 pin IC marked HD68B09), IC816 (16 pin IC marked 74HC00) and IC809 (24 pin IC marked 68B50). These are marked with yellow in the photo. Also remove the ROM chips IC803 & IC804 from their sockets and the RAM (IC801) if it is socketed as these are not required for the upgrade. If ICs 801, 803 & 804 are soldered in they can be left. The battery is also no longer required and can be removed to prevent any danger of leaking in the future.

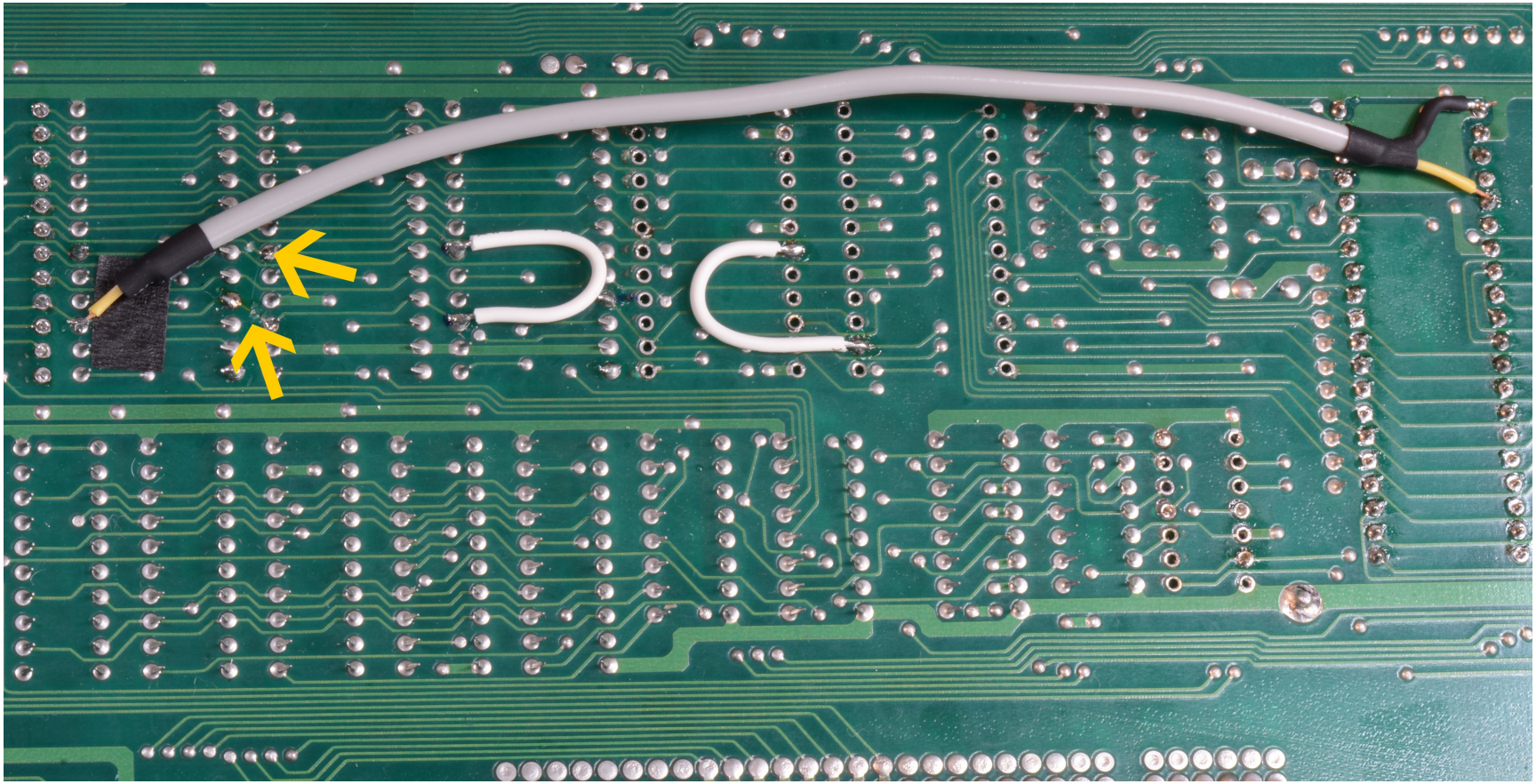
Step 4) Carefully solder in the supplied 40 Pin Socket into the IC805 holes making sure that the notch in the socket is the same orientation as the mark on the board. Put the two links on U816 as shown in the photo. Tape has been used under the links to prevent shorts and is recommended.





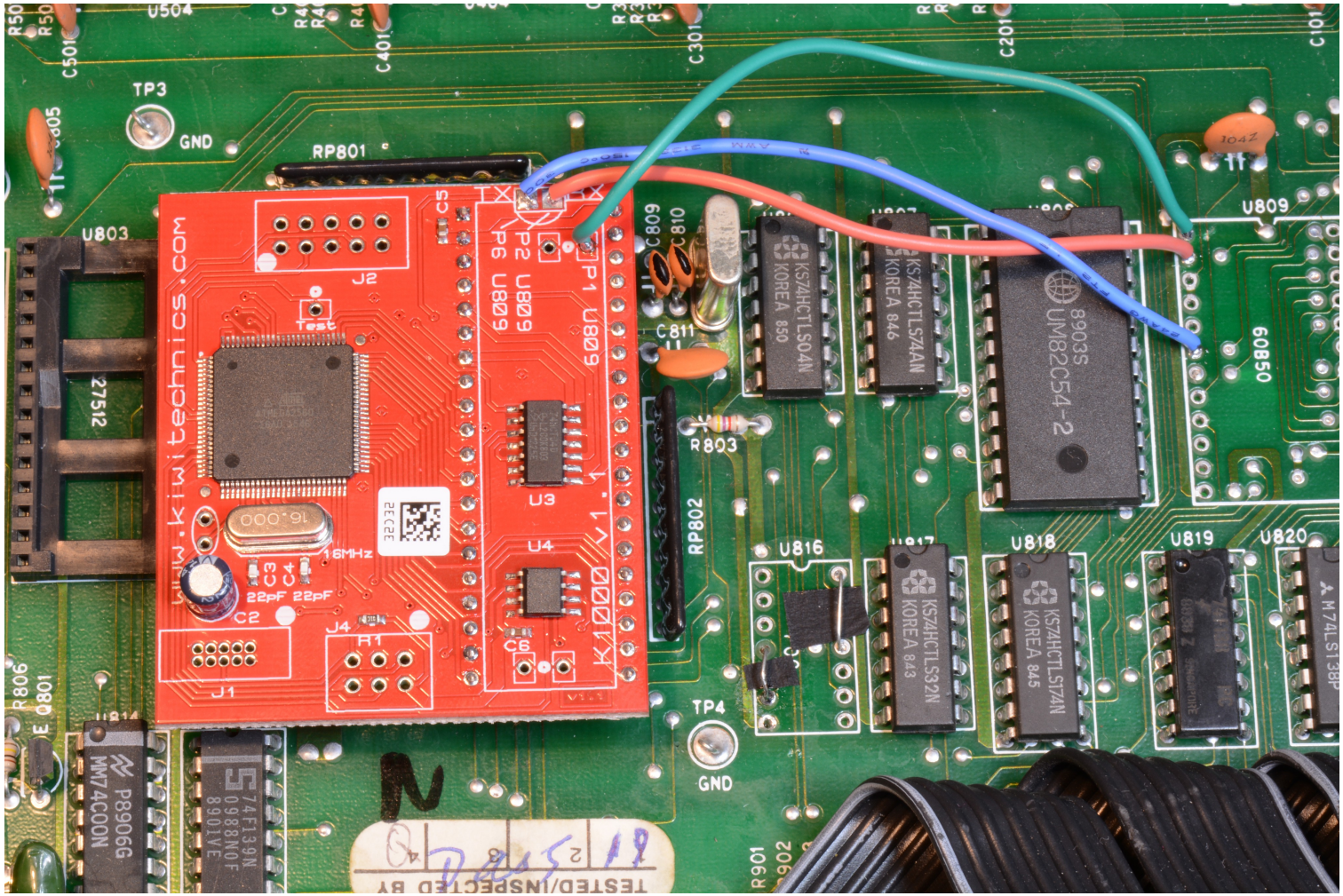
Step 5) On the under side of the board two tracks need to be carefully cut and two jumper wires and the shielded coax wire need to be added. With a sharp knife (a scalpel works best) carefully make two cuts on the track about 1mm apart and with the knife remove the copper between the two cuts. Do this for the two tracks that need to be cut and these are marked in the photo with a closeup in the insert photo. The shielding on the grey coax wire goes to pin 1 of the cpu socket and the yellow center wire goes to pin 5 of the cpu socket. The other end goes to pin 15 of U812. We have put tape under the wire end to prevent shorts and this is recommended.





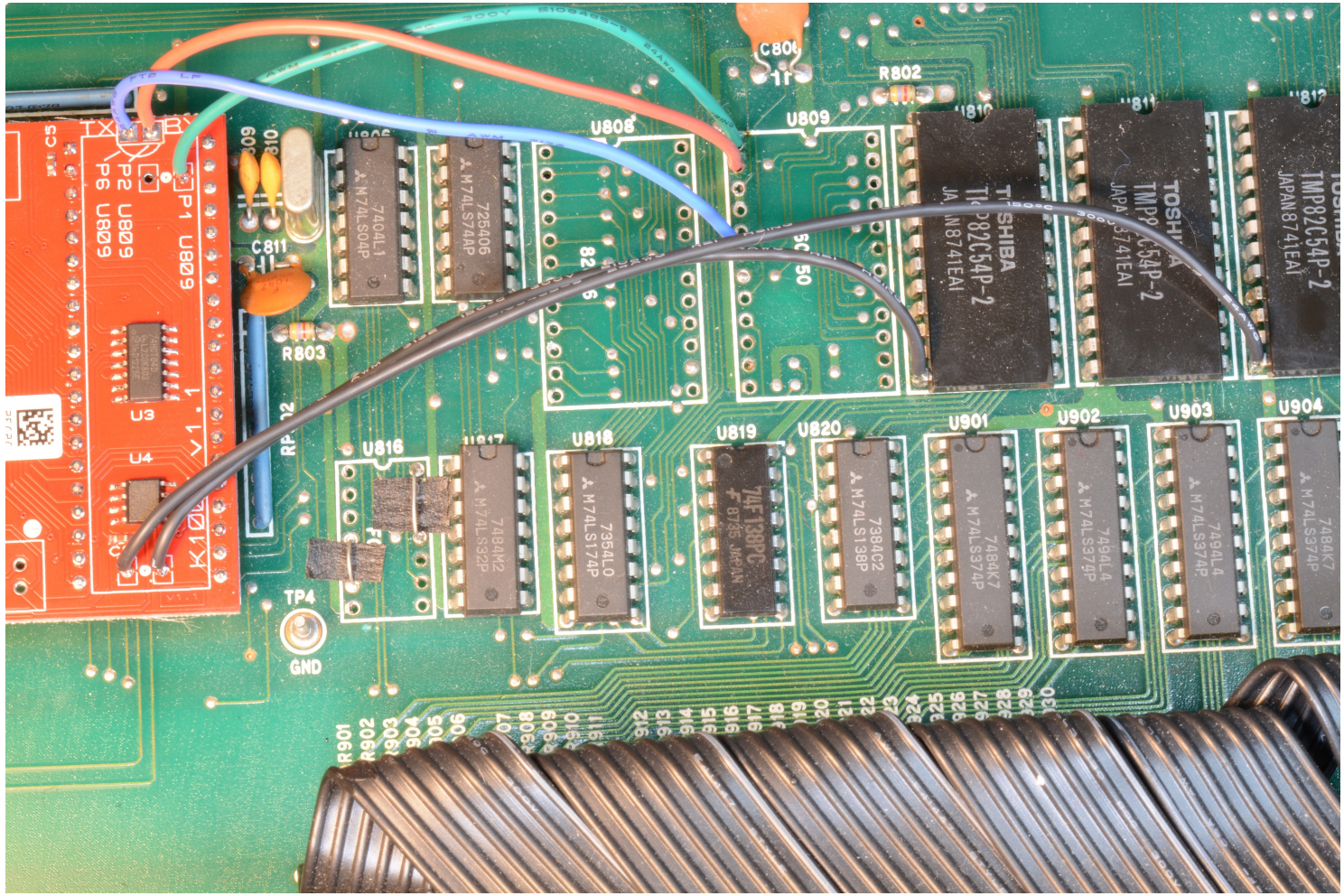
Step 6) When fitting the upgrade board into the socket make sure all the pins are in all the socket holes and press in half way. This will seat the board into the holes. Then with the M1000 board on a static free firm surface and something firm directly under the daughter board area you need to press down firmly until the daughter board is seated fully. It is best to press one end at a time and then the sides until it is fully inserted. The photo shows the board in the final positions. Be gentle but firm and support the board directly under the sockets as you press the daughter board in. It needs to be seated completely.

Step 7) Solder the wires coming from the Kiwi1000 board to the correct locations on the main M1000 board. The destination for each wire is written on the K1000 board and this is shown in the photo.



Step 7a) On early M1000 hardware versions there can sometimes be a problem with the divider chips dropping voices, crackling or interrupting tones and other odd behavior. This is caused by the clock signal to the divider chips getting noise into the clock. This problem is compounded by two things. Firstly the ground layout is poor and an extra ground wire has been provided to link to the DCO dividers. Secondly the Toshiba brand divider with the number TMP82C54P-2 seems to be more susceptible than other brands and a bad clock signal will corrupt the inner control sections of the divider and this can glitch the output and even stop the divider output completely. On our test unit the coax wire on the underside and an extra ground wire as shown in the photo fixed this problem. If this does not work 100% in your M1000 we would suggest you change the divider chips for a different brand. These can still be purchased new from digikey & mouser.

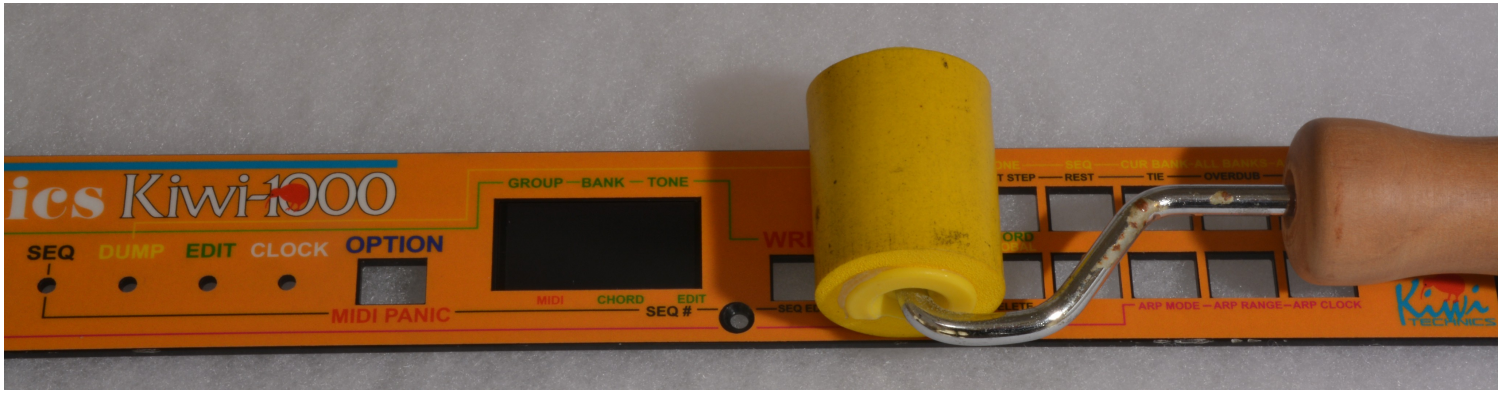
Add the extra ground wires as is shown in the photo.



Step 8) The Kiwitechnics Kiwi-1000 Upgrade comes with a label that is placed over the existing front panel label on the M-1000. It is recommended that you lay the label on a flat surface to let it relax from being rolled into the shipping box. This may take a while so be patient. You can still use the upgrade without it applied as it can be a reference.

Once the label is flat it is applied by pealing back some of the backing starting at the one end and lining up the part of the label with the backing still on up with the existing M-1000 button holes. When it is lined up press down the part that you have removed the backing from and then pull out the rest of the backing paper as you press down the label.

Note these photos show an early version of the label and the production version will differ slightly.



Step 9) The unit needs to have the Calibration run. Run the Synth for 30 mins with the lid on to allow the synth to warm and stabilize. Calibration is started by pressing the WRITE and '0' together as the synth is powered on. Hold the buttons until 'CAL' is displayed on the front display. The voice that is being tested shows on the 6 Mode LEDs. Voice one is on the right most LED and is the same position as the voice on the main board. If a CEM chips fails the LED will flash at the end of the calibration. If this happens then run the calibration a second time to check. Each voice will take 1-2 minutes to calibrate.

If it is required to clear all the memory on the K1000 this can be done by pressing 'WRITE' + '9' as the synth is powered on. This will clear all the memory and all tones 000-999 will contain a 'blank' tone and all Sequences will be blank.

Midi Data

Function	Transmitted	Recognized	Notes
Basic Channel	1-16	1-16	If Omni selected the Kiwi1000 will recognize any midi channel
Note Number		0-127	
Mode	O	O	Voice Modes need to be changed using Midi Control or Sysex commands
Velocity Note On Note Off	X X	O O	
Aftertouch Keys Channels	 X X	 O O	
Pitch Bender	X	O	
Control Change	O	O	Only if Midi CC option is Enabled. See Control Change Tables for details
Program Change	O	0-127	If CC0=0 then CC32 & Program change select Tone 1-1999. Each CC32 number accesses 128 Tones using Program Change (0-127)
System Exclusive	O	O	Only if Midi Sysex option is Enabled - See Sysex Table for details
System Real Time Clock Commands	O	O	Will Transmit from Master Clock if Clock Output is enabled. Input clocks are passed through to midi out unaltered and with minimal delay. Midi Clocks are recognized within the Kiwi1000 only if the clock source has been set to midi on the Master clock source
Modulation	X	O	

Notes X=No O=Yes

Supported Midi Messages	Status	Second	Third	Notes
Note Off	$8n (128-143)	$kk	$yy	n = 0-15 midi channel kk = note number (0-127) yy = Don't care (ignored)
Note On	$9n (144-159)	$kk	$yy	n = 0-15 midi channel kk = note number (0-127) yy = 0=Note Off, 1-127 = Note Velocity.
Polyphonic Aftertouch	$an (160-175)	$kk	$yy	n = 0-15 midi channel kk = note number (0-127) yy = Aftertouch level
Continuous Controllers	$bn (160-191)	$kk	$yy	n = 0-15 midi channel $kk & $yy see CC table
Program Change	$cn (192-207)	0-127	---	n = 0-15 midi channel If CC0 = 0 then for CC32 = 0 for Tones 1-128 1 for Tones 129-256
Channel Aftertouch	$dn (208-223)	$kk	---	n = 0-15 midi channel kk = Aftertouch level
Pitch Bend	$en (224-239)	$kk	$yy	n = 0-15 midi channel kk = Least Significant 7 bits yy = Most Significant 7 bits Note - Internal hardware can only support 12 bits so the 2 LSB are dropped
				Note $xx = hex number

Continuous Controllers

Continuous Controllers	Second	Third	Notes
Bank Select MSB	$00 (00)	$00-$01	0=Bank Selection, 1=Not Used, 2=Seq Selection Used in conjunction with CC32 Bank Select LSB
Modulation Wheel Level	$01 (01)	$00-$7f (0-127)	
Breath Controller	$02 (02)	$00-$7f (0-127)	Not Supported
VCA LFO Amount	$04 (04)	$00-$7e (-63 -> +63)	
Portamento Time	$05 (05)	$00-$7f (0-127)	Sets Portamento Time
NRPN MSB	$06 (06)	$00-$7f (0-127)	Not Supported.
Overall Synth Volume	$07 (07)	$00-$7f (0-127)	Sets Linear Output Level
DCO1 Coarse Tune	$08 (08)	$00-$30 (0-48)	x=0-48 (-12 → +12 notes in half semitone steps)
DCO1 LFO	$09 (09)	$00-$7e (-63 -> +63)	
DCO1 ENV	$0a (10)	$00-$7e (-63 -> +63)	
DCO1 PW	$0b (11)	$00-$7f (0-127)	
DCO1 PWM	$0c (12)	$00-$7f (0-127)	
DCO1 DYN	$0d (13)	$00-$7f (0-127)	
DCO2 Coarse Tune	$0e (14)	$00-30 (0-48)	x=0-48 (-12 → +12 notes in half semitone steps)
DCO2 Fine Tune	$0f (15)	$00-$64 (0-100)	0-100 = -50 → + 50 cents
DCO2 LFO	$10 (16)	$00-$7e (-63 -> +63)	
DCO2 ENV	$11 (17)	$00-$7e (-63 -> +63)	
DCO2 PW	$12 (18)	$00-$7f (0-127)	
DCO2 PWM	$13 (19)	$00-$7f (0-127)	
DCO2 DYN	$14 (20)	$00-$7f (0-127)	
DCO Detune	$15 (21)	$00-$7f (0-127)	
DCO Mix	$16 (22)	$00-$7f (0-127)	
Mix ENV	$17 (23)	$00-$7e (-63 -> +63)	
Mix DYN	$18 (24)	$00-$7f (0-127)	
VCA Level	$19 (25)	$00-$7f (0-127)	Sets Exponential Output Level
VCA DYN	$1a (26)	$00-$7f (0-127)	
VCF Low Pass Cutoff	$1b (27)	$00-$7f (0-127)	
VCF Low Pass Resonance	$1c (28)	$00-$7f (0-127)	
VCF LFO	$1d (29)	$00-$7e (-63 -> +63)	
VCF ENV	$1e (30)	$00-$7e (-63 -> +63)	
VCF KEY	$1f (31)	$00-$7f (0-127)	
Bank Select LSB	$20 (32)	$00-$7f (0-127)	Selects Bank sets for Program Select $00 (0) for Tones 1-128 $01 (1) for Tones 129-256
VCF FM	$21 (33)	$00-$7f (0-127)	
VCF DYN	$22 (34)	$00-$7f (0-127)	
ENV 1 Attack	$23 (35)	$00-$7f (0-127)	
ENV 1 Decay	$24 (36)	$00-$7f (0-127)	
ENV 1 Sustain	$25 (37)	$00-$7f (0-127)	
NRPN LSB	$26 (38)	$00-$7f (0-127)	Not Supported.
ENV 1 Release	$27 (39)	$00-$7f (0-127)	
ENV 2 Attack	$28 (40)	$00-$7f (0-127)	
ENV 2 Decay	$29 (41)	$00-$7f (0-127)	

Continuous Controllers

Continuous Controllers	Second	Third	Notes
ENV 2 Sustain	$2a (42)	$00-$7f (0-127)	
ENV 2 Release	$2b (43)	$00-$7f (0-127)	
LFO 1 Rate	$2c (44)	$00-$7f (0-127)	
LFO 1 Delay	$2d (45)	$00-$7f (0-127)	
LFO 2 Rate	$2e (46)	$00-$7f (0-127)	
LFO 2 Delay	$2f (47)	$00-$7f (0-127)	
LFO 3 Rate	$30 (48)	$00-$7f (0-127)	
LFO 3 Delay	$31 (49)	$00-$7f (0-127)	
Internal Clock Rate	$32 (50)	$00-$7f (0-127)	GLOBAL – 0-127=5-299 BPM
Patch Clock Tempo	$33 (51)	$00-$7f (0-127)	0-127=5-299 BPM
Matrix Midi CC #1	$34 (52)	$00-$7f (0-127)	Source Input for Matrix - Use Sysex for Matrix Control
Matrix Midi CC #2	$35 (53)	$00-$7f (0-127)	Source Input for Matrix
Matrix Midi CC #3	$36 (54)	$00-$7f (0-127)	Source Input for Matrix
Matrix Midi CC #4	$37 (55)	$00-$7f (0-127)	Source Input for Matrix
Matrix Midi CC #5	$38 (56)	$00-$7f (0-127)	Source Input for Matrix
Matrix Midi CC #6	$39 (57)	$00-$7f (0-127)	Source Input for Matrix
VCF FMM Level	$3a (58)	$00-$7f (0-127)	
ENV 3 Attack	$3b (59)	$00-$7f (0-127)	
ENV 3 Decay	$3c (60)	$00-$7f (0-127)	
ENV 3 Sustain	$3d (61)	$00-$7f (0-127)	
ENV 3 Release	$3e (62)	$00-$7f (0-127)	
Analogue Feel	$3f (63)	$00-$7f (0-127)	
Hold Pedal	$40 (64)	$yy	yy = $00-$3f (0-63) Off $40-$7f (64-127) On
DCO1 Range	$41 (65)	$yy	yy = $00-$0f (0-15) 64' $10-$1f (16-31) 32' $20-$2f (32-47) 16' $30-$3f (48-63) 8' $40-$4f (64-79) 4' $50-$7f (80-127) 2'
DCO1 Wave	$42 (66)	$yy	yy = $00-$1f (0-31) Off $20-$3f (32-63) Saw/Triangle $40-$5f (64-95) Pulse $60-$7f (96-127) Pulse + Saw/Triangle
DCO1 LFO Source	$43 (67)	$yy	yy = $00-$1f (00-31) LFO 1 $20-$3f (32-63) LFO 2 $40-$7f (64-127) LFO 3
DCO1 ENV Source	$44 (68)	$yy	yy = $00-$1f (0-31) ENV 1 $20-$2f (32-63) ENV 2 $40-$7f (64-127) ENV 3
DCO1 PWM Source	$45 (69)	$yy	yy = $00-$1f (0-31) ENV 1 $20-$3f (32-63) ENV 3 $40-$5f (64-95) LFO 1 $60-$7f (96-127) LFO 2
DCO2 Range	$46 (70)	$yy	yy = $00-$0f (0-15) 64' $10-$1f (16-31) 32' $20-$2f (32-47) 16' $30-$3f (48-63) 8' $40-$4f (64-79) 4' $50-$7f (80-127) 2'

Continuous Controllers

Continuous Controllers	Second	Third	Notes
DCO2 Wave	$47 (71)	$yy	yy = $00-$0f (0-15) Off $10-$1f (16-31) Saw/Triangle $20-$2f (32-47) Pulse $30-$3f (48-63) Pulse + Saw/Triangle $40-$7f (64-127) Noise
DCO2 LFO Source	$48 (72)	$yy	yy = $00-$1f (00-31) LFO 1 $20-$3f (32-63) LFO 2 $40-$7f (64-127) LFO 3
DCO2 ENV Source	$49 (73)	$yy	yy = $00-$1f (0-31) ENV 1 $20-$2f (32-63) ENV 2 $40-$7f (64-127) ENV 3
DCO2 PWM Source	$4a (74)	$yy	yy = $00-$1f (0-31) ENV 1 $20-$3f (32-63) ENV 3 $40-$5f (64-95) LFO 1 $60-$7f (96-127) LFO 2
VCF LFO Source	$4b (75)	$yy	yy = $00-$1f (00-31) LFO 1 $20-$3f (32-63) LFO 2 $40-$7f (64-127) LFO 3
VCF ENV Source	$4c (76)	$yy	yy = $00-$1f (0-31) ENV 1 $20-$2f (32-63) ENV 2 $40-$7f (64-127) ENV 3
VCA Mode	$4d (77)	$yy	yy = $00-$1f (0-31) Gate $20-$3f (32-63) ENV 1 $40-$5f (64-95) ENV 2 $60-$7f (96-127) ENV 3
VCA LFO Source	$4e (78)	$yy	yy = $00-$1f (00-31) LFO 1 $20-$3f (32-63) LFO 2 $40-$7f (64-127) LFO 3
LFO 1 Wave	$4f (79)	$yy	yy = $00-$0f (0-15) Sine $10-$1f (16-31) Triangle $20-$2f (32-47) Saw $30-$3f (48-63) Rev Saw $40-$4f (63-79) Square $50-$5f (80-95) Random $60-$7f (96-127) Fast Random
LFO 2 Wave	$50 (80)	$yy	yy = $00-$0f (0-15) Sine $10-$1f (16-31) Triangle $20-$2f (32-47) Saw $30-$3f (48-63) Rev Saw $40-$4f (63-79) Square $50-$5f (80-95) Random $60-$7f (96-127) Fast Random
LFO 3 Wave	$51 (81)	$yy	yy = $00-$0f (0-15) Sine $10-$1f (16-31) Triangle $20-$2f (32-47) Saw $30-$3f (48-63) Rev Saw $40-$4f (63-79) Square $50-$5f (80-95) Random $60-$7f (96-127) Fast Random
Load Sequence	$52 (82)	$00-$08 (0-8)	0 = Do not load sequence 1-28= Load Seq 1-8 All other numbers ignored Seq 1-8 are 124 step
Midi Control (Midi Start/Stop Enable) Note: if a Tone is saved with ARP and/or SEQ running the midi Start Enable will also be saved for each section running	$53 (83)	$yy	yy = $00-$1f (0-31) All Off $20-$3f (32-63) ARP Enabled $40-$5f (64-95) SEQ Enabled $60-$7f (96-127) ARP+SEQ Enabled

Continuous Controllers

Continuous Controllers	Second	Third	Notes
XMod	$54 (84)	$yy	$yy = $00-$1f (0-31) Off $20-$3f (32-63) Sync 1 $40-$5f (64-95) Sync 2 $60-$7f (96-127) Cross Mod
Key Mode	$55 (85)	$yy	yy = $00-$0f (0-15) Poly Single $10-$1f (16-31) Poly Dual $20-$2f (32-47) Poly Triple $30-$3f (48-63) Unison $40-$7f (64-127) Solo
Arpeggiator Mode	$56 (86)	$yy	$yy = $00-$0f (0-15) Up $10-$1f (16-31) Down $20-$2f (32-47) Up & Down $30-$3f (48-63) Random $40-$7f (64-127) As Played
Arpeggiator Range	$57 (87)	$yy	$yy = $00-$1f (0-31) 1 Octave $20-$3f (32-63) 2 Octaves $40-$5f (64-79) 3 Octaves $60-$7f (80-127) 4 Octaves
Arpeggiator Clock Divide	$58 (88)	$yy	$yy = $00-$09 (0-9)- Half Note (48/Step) $0a-$13 (10-19)-Quarter note (24/Step) $14-$1d (20-29)-8th note (12/Step) $1e-$27 (30-39)-8th note, 1/2 swing (14,10/Step) $28-$31 (40-49)-8th note, full swing (16,8/Step) $32-$3b (50-59)-8th note triplets (8/Step) $3c-$45 (60-69)-16th note (6/Step) $46-$4f (70-79)-16th note, half swing (7,5/Step) $50-$59 (80-89)-16th note, full swing (8,4/Step) $5a-$63 (90-99)-16th note triplets (4/Step) $64-$6d (100-109)-32nd note (3/Step) $6e-$77 (110-119)-32nd note triplets (2/Step) $78-$7f (120-127)-64th note triplets (1/Step)
Sequencer Clock Divide	$59 (89)	$yy	$yy = $00-$09 (0-9)- Half Note (48/Step) $0a-$13 (10-19)-Quarter note (24/Step) $14-$1d (20-29)-8th note (12/Step) $1e-$27 (30-39)-8th note, 1/2 swing (14,10/Step) $28-$31 (40-49)-8th note, full swing (16,8/Step) $32-$3b (50-59)-8th note triplets (8/Step) $3c-$45 (60-69)-16th note (6/Step) $46-$4f (70-79)-16th note, half swing (7,5/Step) $50-$59 (80-89)-16th note, full swing (8,4/Step) $5a-$63 (90-99)-16th note triplets (4/Step) $64-$6d (100-109)-32nd note (3/Step) $6e-$77 (110-119)-32nd note triplets (2/Step) $78-$7f (120-127)-64th note triplets (1/Step)
Master Clock Source	$5a (90)	$yy	$yy = $00-$3f(0-63) Internal $40-$7f(64-127) Midi
Bend Range	$5b (91)	$00-$7f (0-127)	0-127 (127=±1 Octave)
Mod Wheel Destination	$5c (92)	$yy	$yy = $00-$1f(0-31) OFF $20-$3f(32-63) DCO 1 & 2 $40-$5f(64-79) VCF $60-$7f(80-127) VCA For combinations use sysex control
AT Destination	$5d (93)	$yy	$yy = $00-$1f(0-31) OFF $20-$3f(32-63) DCO 1 & 2 $40-$5f(64-79) VCF $60-$7f(80-127) VCA For combinations use sysex control
VCF FMM Source	$5e (94)	$yy	yy = $00-$1f (0-31) ENV 1 $20-$3f (32-63) ENV 3 $40-$5f (64-95) LFO 1 $60-$7f (96-127) LFO 2

Continuous Controllers

Continuous Controllers	Second	Third	Notes
Voice Mode Steal Option	$5f (95)	$yy	yy = $00-$0f(0-15) Steal Oldest $10-$1f(16-31) Steal Newest $20-$2f(32-47) Steal Highest $30-$3f(48-63) Steal Lowest $40-$4f(64-79) Steal Quietest $50-$7f(80-127) Do Not Steal
NRPN Data Plus	$60 (96)		Not Supported
NRPN Data Minus	$61 (97)		Not Supported
NRPN Data LSB	$62 (98)		Not Supported
NRPN Data MSB	$63 (99)		Not Supported
RPN Data LSB	$64 (100)		Not Supported
RPN Data MSB	$65 (101)		Not Supported
Voice Mode Envelopes	$66 (102)	$yy	yy = $00-$3f (0-63) Staccato $40-$7f (64-127) Legato
Start/Stop Arp	$67 (103)	$yy	yy = $00-$3f (0-63) Arp Stopped $40-$7f (64-127) Arp Playing
Start/Stop Seq	$68 (104)	$yy	yy = $00-$3f (0-63) Seq Stopped $40-$7f (64-127) Seq Playing
Mix ENV Source	$69 (105)	$yy	yy = $00-$1f (0-31) ENV 1 $20-$2f (32-63) ENV 2 $40-$7f (64-127) ENV 3
DCO1 Wave Shape	$6a (106)	$00-$7f (0-127)	
DCO2 Wave Shape	$6b (107)	$00-$7f (0-127)	
Matrix 0 Level	$6c (108)	$00-$7e (-63 -> +63)	
Matrix 1 Level	$6d (109)	$00-$7e (-63 -> +63)	
Matrix 2 Level	$6e (110)	$00-$7e (-63 -> +63)	
Matrix 3 Level	$6f (111)	$00-$7e (-63 -> +63)	
Matrix 4 Level	$70 (112)	$00-$7e (-63 -> +63)	
Matrix 5 Level	$71 (113)	$00-$7e (-63 -> +63)	
Matrix 6 Level	$72 (114)	$00-$7e (-63 -> +63)	
Matrix 7 Level	$73 (115)	$00-$7e (-63 -> +63)	
Matrix 8 Level	$74 (116)	$00-$7e (-63 -> +63)	
Master Tune	$76 (118)	$00-$7f (0-127)	
Program Change	$77 (119)	$yy	yy = $00-$7f (0-127) Program Number Note – this is only here because the BCR2000 is not able to step programs using two buttons
All Sound off	$78 (120)		Stops all output immediately
All Notes off	$7b (123)		Stops all output immediately

Real Time Commands

Midi Clock	$f8 (248)		Midi Timing Clock
Start	$fa (250)		Start Arp/Sequence Play
Stop	$fc (252)		Stop Arp/Sequence Play
Continue	$fb (251)		Continue Arp/Sequence Play

Midi Sysex Support

Function	Transmitted	Recognized	Notes
Basic ID	1-16	1-16	Set using Device ID in Global Variable
Load	O	O	
Dump	O	O	

Function		
Device Enquiry	$F0 $7E <MIDI CHANNEL> $06 $01 $F7	
Device Enquiry Response	$F0	Sysex Start
	$7F	Non Real time reply
	xx	Midi Channel (0-15)
	$06	Enquiry Message
	$02	Enquiry Reply
	$00 $21 $16	Kiwitechnics ID
	$60	Kiwitechnics Family ID
	$06	Product Family ID (Kiwi-1000)
	$00	Product ID
	xx	Major Program Version Byte
	xx	Minor Program Version Byte
	xx	Major BootLoader Version Byte
	xx	Minor BootLoader Version Byte
	xx	Build Number
	xx	Device ID (Global Parameter)
	$F7	End of Sysex

Midi Sysex Data		
		Notes $nn = Hexadecimal Data - Decimal data is in Brackets e.g. $0a (10)
Sysex Header	$f0	Sysex Start
	$00 $21 $16	Kiwitechnics Manufacturers ID
	$60	Kiwitechnics Family ID
	$06	Kiwitechnics Kiwi-1000 ID
	xx	Command ID (see table 1.0) $01 = Request Global Dump $02 = Transmit/Receive Global Dump $03 = Request Tone Edit Buffer Dump $04 = Transmit/Receive Tone Edit Buffer Dump $05 = Request Tone Dump $06 = Transmit/Receive Tone Dump $09 = Request Seq Dump $0a = Transmit/Receive Seq Dump $0d = Request Tone Parameter $0e = Transmit/Receive Tone Parameter $0f = Request Global Parameter $10 = Transmit/Receive Global Parameter
	Data	Depending on command type (see table 1.0)
	$f7	Sysex Footer

WARNING! Sysex dumps have the ability to put non valid settings into memory and few checks are made for validity. If the Kiwi-1000 becomes unusable due to non valid data you may need to do a full restore of the Kiwi-1000 which will lose all saved memory.

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
$01 (1) Request Global Dump	No Data		Kiwi-1000 transmits a $02 (2) command
$02 (2) Transmit or Receive Global Dump 32 data bytes	$00 (0) = Midi Channel In	000yxxxx	xxxx = 0-15 for midi channel 1-16 y = set for Omni
	$01 (1) = Midi Channel Out	0000xxxx	xxxx = 0-15 for midi channel 1-16
	$02 (2) = Seq Midi Channel Out	0000xxxx	xxxx = 0-15 for midi channel 1-16
	$03 (3) = Enable MidiCC	000000xx	xx = 00=Off 01=CC Receive Enabled (Default) 02=CC Transmit Enabled 03=CC Receive & Transmit Enabled
	$04 (4) = Enable Sysex	0000000x	x = Off/On (set=On)
	$05 (5) = Enable Program Change	000000xx	xx = 00=None 01=PC Receive Enabled (Default) 02=PC Transmit Enabled 03=PC Receive & Transmit Enabled
	$06 (6) = Midi Soft Through	000000xx	xx = 00=Stop all 01=Pass all 10=Pass only nonCC 11=Stop only CC we have used Note - SysEx intended for the Kiwi-1000 will not be passed Note – Active Sensing commands are suppressed within the Kiwi-1000 and are not passed on
	$07 (7) = Enable Midi Clock Gen	0000000x	x = Off/On (set=On)
	$08 (8) = Master Clock Source	0000000x	x= 0-Internal 1-Midi
	$09 (9) = Int Clock RateHi	0000xxxx	This byte is sent as two nibbles which are combined to make single 8 bit command. 0000xxxx + 0000yyyy = xxxxyyyy 0-255 = 5-300 BPM
	$0a (10) = Int Clock RateLo	0000yyyy	This byte is sent as two nibbles which are combined to make single 8 bit command. 0000xxxx + 0000yyyy = xxxxyyyy 0-255 = 5-300 BPM
	$0b (11) = Master Fine Tune	0xxxxxxx	x = Master Fine Tune (+- 100 cents)
	$0c (12) = Clock Display	0000000x	x = 0 = Disable Front Panel Clock Display 1 = Enable Front Panel Clock Display

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$0d (13) = Guitar Mode	0000000x	x = 0 = Disable Guitar Mode 1 = Enable Guitar Mode
	$0e-$1f (14-31) = Nulls		Not currently Used
$03 (3) Request Tone Edit Buffer Dump Null x 2	2 x Null		
$04 (4) Transmit/Receive Tone Edit Buffer Dump Null x 2 + 128 data bytes	$01-$02 (1-2) - 2 x Null + 128 bytes data		2 x null bytes sent followed by 128 bytes of data in the following format
	$00-$0f (0-15) = Tone Name	Ascii Bytes	Tone Name
	$10 (16)=DCO1 Wave/Range	000zyxxx	xxx = DCO1 Range 000 = 64' 001 = 32' 010 = 16' 011 = 8' 100 = 4' 101 = 2' y = DCO1 Pulse (On if bit set) z = DCO1 Wave 0=Off 1=Saw/Triangle
	$11 (17)=DCO1 Wave Shape	0xxxxxxx	x = Range $00-$7f (0-127)
	$12 (18)=DCO1 Coarse Tune	0xxxxxxx	x=0-48 (-12 → +12 notes in half semitone steps)
	$13 (19)=DCO1 LFO Amount	0xxxxxxx	x = Range $00-$7e (-63 -> 0 -> +63)
	$14 (20)=DCO1 ENV Amount	0xxxxxxx	x = Range $00-$7e (-63 -> 0 -> +63)
	$15 (21)=DCO1 PW Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$16 (22)=DCO1 PWM Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$17 (23)=DCO1 DYN Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$18 (24)=DCO1 Control	0ww0yyzz	zz = DCO1Env(00=Env1,01=Env2,10=Env3) yy = DCO1LFO(00=LFO1,01=LFO2,10=LFO3) ww = DCO1PWM Src(00=Env1,01=Env3,10=LFO2,11=LFO3)

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$19 (25)=DCO2 Wave/Range	0w0zyxxx	xxx = DCO2 Range 000 = 64' 001 = 32' 010 = 16' 011 = 8' 100 = 4' 101 = 2' y = DCO2 Pulse (On if bit set) zz = DCO1 Wave 0=Off 1=Saw/Triangle w = DCO2 Noise (On if bit set)
	$1a (26)=DCO2 Wave Shape	0xxxxxxx	x = Range $00-$7f (0-127)
	$1b (27)=DCO2 Coarse Tune	0xxxxxxx	x=0-48 (-12 → +12 notes in half semitone steps)
	$1c (28)=DCO2 Fine Tune	0xxxxxxx	x=0-127 +- 50 Cents and zero 0-63 is shifted down 64 is not shifted 65-127 is shifted up
	$1d (29)=DCO2 LFO Amount	0xxxxxxx	x = Range $00-$7e (-63 -> 0 -> +63)
	$1e (30)=DCO2 ENV Amount	0xxxxxxx	x = Range $00-$7e (-63 -> 0 -> +63)
	$1f (31)=DCO2 PW Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$20 (32)=DCO2 PWM Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$21 (33)=DCO2 DYN Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$22 (34) DCO Xmod	0vv000xx	xx = 00=Off 01=Sync1 10=Sync2 11=XMod vv = Tone Layout Version (00=v1.1->1.3, 01=v1.4+)
	$23 (35)=DCO2 Control	0wwyyzz	zz = DCO1Env(00=Env1,01=Env2,10=Env3) yy = DCO1LFO(00=LFO1,01=LFO2,10=LFO3) ww = DCO1PWM Src(00=Env1,01=Env3,10=LFO2,11=LFO3)
	$24 (36)=Voice Detune Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$25 (37)=DCO1/2 Mix	0xxxxxxx	x = Range $00-$7f (0-127)
	$26 (38)=MIX DYN Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$27 (39)=MIX Env Amount	0xxxxxxx	x = Range $00-$7e (-63 -> 0 -> +63)
	$28 (40)=Mix Control	000000zz	zz = MixEnv(00=Env1,01=Env2,10=Env3)
	$29 (41)=VCF Cutoff Hi	000xxxxx	

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$2a (42)=VCF Cutoff Lo	0yyyyyyy	Hi & Lo are combined to make single 12 bit command. 000xxxxx + 0yyyyyyy = 0000xxxx xyyyyyyy x = Range $0-$fff (0-4095)
	$2b (43)=VCF Resonance Hi	000xxxxx	
	$2c (44)=VCF Resonance Lo	0yyyyyyy	Hi & Lo are combined to make single 12 bit command. 000xxxxx + 0yyyyyyy = 0000xxxx xyyyyyyy x = Range $0-$fff (0-4095)
	$2d (45)=VCF LFO Amount	0xxxxxxx	x = Range $00-$7e (-63 -> 0 -> +63)
	$2e (46)=VCF ENV Amount	0xxxxxxx	x = Range $00-$7e (-63 -> 0 -> +63)
	$2f (47)=VCF KEY Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$30 (48)=VCF FM Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$31 (49)=VCF FMM Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$32 (50)=VCF FM DYN Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$33 (51)=VCF DYN Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$34 (52)=VCF Control	0ww0yyzz	zz = VCFEnv(00=Env1,01=Env2,10=Env3) yy = VCFLFO(00=LFO1,01=LFO2,10=LFO3) ww = VCFPMM Src Pol(00=Env2,01=Env3,10=LFO2,11=LFO3)
	$35 (53)=VCA Exp Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$36 (54)=VCA Lin Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$37 (55)=VCA LFO Amount	0xxxxxxx	x = Range $00-$7e (-63 -> 0 -> +63)
	$38 (56)=VCA Control	000yyzzz	zzz = VCAENV(000=Gate,001=Env1,010=Env2,011=Env3) yy = VCALFO(00=LFO1,01=LFO2,10=LFO3)
	$39 (57)=VCA DYN Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$3a (58)=Matrix 0 Source	000xxxxx	x = 0-22 – See Table 1
	$3b (59)=Matrix 0 Level	0xxxxxxx	x = Range $00-$7e (-63 -> 0 -> +63)
	$3c (60)=Matrix 0 Destination	000xxxxx	x = 0-34 – See Table 3
	$3d (61)=Matrix 1 Source	000xxxxx	x = 0-22 – See Table 1
	$3e (62)=Matrix 1 Level	0xxxxxxx	x = Range $00-$7e (-63 -> 0 -> +63)
	$3f (63)=Matrix 1 Destination	000xxxxx	x = 0-34 – See Table 3
	$40 (64)=Matrix 2 Source	000xxxxx	x = 0-22 – See Table 1
	$41 (65)=Matrix 2 Level	0xxxxxxx	x = Range $00-$7e (-63 -> 0 -> +63)
	$42 (66)=Matrix 2 Destination	000xxxxx	x = 0-34 – See Table 3
	$43 (67)=Matrix 3 Source	000xxxxx	x = 0-22 – See Table 1

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$44 (68)=Matrix 3 Level	0xxxxxxx	x = Range $00-$7e (-63 -> 0 -> +63)
	$45 (69)=Matrix 3 Destination	000xxxxx	x = 0-34 – See Table 3
	$46 (70)=Matrix 4 Source	000xxxxx	x = 0-22 – See Table 1
	$47 (71)=Matrix 4 Level	0xxxxxxx	x = Range $00-$7e (-63 -> 0 -> +63)
	$48 (72)=Matrix 4 Destination	000xxxxx	x = 0-34 – See Table 3
	$49 (73)=Matrix 5 Source	000xxxxx	x = 0-22 – See Table 1
	$4a (74)=Matrix 5 Level	0xxxxxxx	x = Range $00-$7e (-63 -> 0 -> +63)
	$4b (75)=Matrix 5 Destination	000xxxxx	x = 0-34 – See Table 3
	$4c (76)=Matrix 6 Source	000xxxxx	x = 0-22 – See Table 1
	$4d (77)=Matrix 6 Level	0xxxxxxx	x = Range $00-$7e (-63 -> 0 -> +63)
	$4e (78)=Matrix 6 Destination	000xxxxx	x = 0-34 – See Table 3
	$4f (79)=Matrix 7 Source	000xxxxx	x = 0-22 – See Table 1
	$50 (80)=Matrix 7 Level	0xxxxxxx	x = Range $00-$7e (-63 -> 0 -> +63)
	$51 (81)=Matrix 7 Destination	000xxxxx	x = 0-34 – See Table 3
	$52 (82)=Matrix 8 Source	000xxxxx	x = 0-22 – See Table 1
	$53 (83)=Matrix 8 Level	0xxxxxxx	x = Range $00-$7e (-63 -> 0 -> +63)
	$54 (84)=Matrix 8 Destination	000xxxxx	x = 0-34 – See Table 3
	$55 (85) Env 1 Delay	0xxxxxxx	x = Range $00-$7f (0-127)
	$56 (86) Env 2 Delay	0xxxxxxx	x = Range $00-$7f (0-127)
	$57 (87) Env 3 Delay	0xxxxxxx	x = Range $00-$7f (0-127)
	$58 (88)=ENV1 Attack	0xxxxxxx	x = Range $00-$7f (0-127)
	$59 (89)=ENV1 Decay	0xxxxxxx	x = Range $00-$7f (0-127)
	$5a (90)=ENV1 Sustain	0xxxxxxx	x = Range $00-$7f (0-127)
	$5b (91)=ENV1 Release	0xxxxxxx	x = Range $00-$7f (0-127)
	$5c (92)=ENV2 Attack	0xxxxxxx	x = Range $00-$7f (0-127)
	$5d (93)=ENV2 Decay	0xxxxxxx	x = Range $00-$7f (0-127)
	$5e (94)=ENV2 Sustain	0xxxxxxx	x = Range $00-$7f (0-127)
	$5f (95)=ENV2 Release	0xxxxxxx	x = Range $00-$7f (0-127)
	$60 (96)=ENV3 Attack	0xxxxxxx	x = Range $00-$7f (0-127)
	$61 (97)=ENV3 Decay	0xxxxxxx	x = Range $00-$7f (0-127)

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$62 (98)=ENV3 Sustain	0xxxxxxx	x = Range $00-$7f (0-127)
	$63 (99)=ENV3 Release	0xxxxxxx	x = Range $00-$7f (0-127)
	$64 (100)=LFO 1 Wave	000000xxx	xxx = 000=Sine 001=Triangle 010=Square 011=Saw 100=Reverse Saw 101=Random 110=Fast Random
	$65 (101)=LFO 1 Rate	0xxxxxxx	x = Range $00-$7f (0-127)
	$66 (102)=LFO 1 Delay	0xxxxxxx	x = Range $00-$7f (0-127)
	$67 (103)=LFO1Control	00xxxxxy	y = 0=Mode (0=Normal,1=Plus) xxxxx= 00000-Free Running 00001-Sync Two Notes (192 Clocks/Step) 00010-Sync Dotted Whole Note (144 Clocks/Step) 00011-Sync Whole Note (96 Clocks/Step) 00100-Sync Dotted Half Note (72 Clocks/Step) 00101-Sync Half Note (48 Clocks/Step) 00110-Sync Dotted 1/4 Note (36 Clocks/Step) 00111-Sync Quarter note (24 Clocks/Step) 01000-Sync Dotted 1/8 Note (18 Clocks/Step) 01001-Sync 1/4 Note Triplets (16 Clocks/Step) 01010-Sync 8th note (12 Clocks/Step) 01011-Sync 8th note triplets (8 Clocks/Step) 01100-Sync 16th note (6 Clocks/Step) 01101-Sync 16th note triplets (4 Clocks/Step) 01110-Sync 32nd note (3 Clocks/Step) 01111-Sync 32nd note triplets (2 Clocks/Step) 10000-Sync 64th note triplets (1 Clocks/Step) Sync source is Master Clock
	$68 (104)=LFO 2 Wave	000000xxx	xxx = 000=Sine 001=Triangle 010=Square 011=Saw 100=Reverse Saw 101=Random 110=Fast Random
	$69 (105)=LFO 2 Rate	0xxxxxxx	x = Range $00-$7f (0-127)
	$6a (106)=LFO 2 Delay	0xxxxxxx	x = Range $00-$7f (0-127)

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$6b (107)=LFO 2 Control	00xxxxxy	y = 0=Mode (0=Normal,1=Plus) xxxxx= 00000-Free Running 00001-Sync Two Notes (192 Clocks/Step) 00010-Sync Dotted Whole Note (144 Clocks/Step) 00011-Sync Whole Note (96 Clocks/Step) 00100-Sync Dotted Half Note (72 Clocks/Step) 00101-Sync Half Note (48 Clocks/Step) 00110-Sync Dotted 1/4 Note (36 Clocks/Step) 00111-Sync Quarter note (24 Clocks/Step) 01000-Sync Dotted 1/8 Note (18 Clocks/Step) 01001-Sync 1/4 Note Triplets (16 Clocks/Step) 01010-Sync 8th note (12 Clocks/Step) 01011-Sync 8th note triplets (8 Clocks/Step) 01100-Sync 16th note (6 Clocks/Step) 01101-Sync 16th note triplets (4 Clocks/Step) 01110-Sync 32nd note (3 Clocks/Step) 01111-Sync 32nd note triplets (2 Clocks/Step) 10000-Sync 64th note triplets (1 Clocks/Step) Sync source is Master Clock
	$6c (108)=LFO 3 Wave	000000xxx	xxx = 000=Sine 001=Triangle 010=Square 011=Saw 100=Reverse Saw 101=Random 110=Fast Random
	$6d (109)=LFO 3 Rate	0xxxxxxx	x = Range $00-$7f (0-127)
	$6e (110)=LFO 3 Delay	0xxxxxxx	x = Range $00-$7f (0-127)

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$6f (111)=LFO 3 Control	00xxxxxy	y = 0=Mode (0=Normal,1=Plus) xxxxx= 00000-Free Running 00001-Sync Two Notes (192 Clocks/Step) 00010-Sync Dotted Whole Note (144 Clocks/Step) 00011-Sync Whole Note (96 Clocks/Step) 00100-Sync Dotted Half Note (72 Clocks/Step) 00101-Sync Half Note (48 Clocks/Step) 00110-Sync Dotted 1/4 Note (36 Clocks/Step) 00111-Sync Quarter note (24 Clocks/Step) 01000-Sync Dotted 1/8 Note (18 Clocks/Step) 01001-Sync 1/4 Note Triplets (16 Clocks/Step) 01010-Sync 8th note (12 Clocks/Step) 01011-Sync 8th note triplets (8 Clocks/Step) 01100-Sync 16th note (6 Clocks/Step) 01101-Sync 16th note triplets (4 Clocks/Step) 01110-Sync 32nd note (3 Clocks/Step) 01111-Sync 32nd note triplets (2 Clocks/Step) 10000-Sync 64th note triplets (1 Clocks/Step) Sync source is Master Clock
	$70 (112)=Portamento Rate	0xxxxxxx	x = Range $00-$7f (0-127)
	$71 (113)=Load Sequence	000xxxxx	Seq number to load (1-8) - 0 is do not load Seq
	$72 (114)=Voice Mode 1	000w0yyy	yyy = 000=Poly Single (1 voice/note – max 6 notes) 001=Poly Dual (2 voices/note – max 3 notes) 010=Poly Triple (3 voices/note – max 2 notes) 011=Not Used 100=Unison 101=Solo w = 0 = Staccato – Envs restarted for each note 1 = Legato - Envs restarted only if all notes off
	$73 (115)=Voice Mode 2	00000yyy	yyy = 000=Steal Oldest Voice 001=Steal Newest Voice 010=Steal Highest Voice 011=Steal Lowest Voice 100=Steal Quietest Voice 101=Steal Off (7th note ignored)
	$74 (116)=Arp Control	00yyy0zz	zz = 00=1Oct,01=2Oct,10=3Oct yyy = 000=Up,001=Dn,010=U/D,011=Rndm,100=As Played
	$75 (117)=AT Control	0000wxyz	z = DCO1 LFO (1=on) y = DCO2 LFO (1=on) x = VCF Cutoff (1=on) w = VCA Level (1=on)

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$76 (118)=MW Control	0000wxyz	z = DCO1 LFO (1=on) y = DCO2 LFO (1=on) x = VCF Cutoff (1=on) w = VCA Level (1=on)
	$77 (119)=Midi Control	0000w0yz	z = Arp Enable (1=Enabled) y = Sequence Enable (1=Enabled) w = Hold Enabled (1=Hold On)
	$78 (120)=Patch Clock TempoHi	0000xxxx	If this is nonzero it will replace the internal Clock speed with this temporary value. If this value is zero the internal clock will remain unchanged. 1-255 = 6-300 BPM This byte is sent as two nibbles which are combined to make single 8 bit command. 0000xxxx + 0000yyyy = xxxxyyyy
	$79 (121)=Patch Clock TempoLo	0000yyyy	
	$7a (122)=ArpClockDivide	0000xxxx	xxxx= 0000-Half Note (48 Clocks/Step) 0001-Quarter note (24 Clocks/Step) 0010-8th note (12 Clocks/Step) 0011-8th note, half swing (14,10 Clocks/Step) 0100-8th note, full swing (16,8 Clocks/Step) 0101-8th note triplets (8 Clocks/Step) 0110-16th note (6 Clocks/Step) 0111-16th note, half swing (7,5 Clocks/Step) 1000-16th note, full swing (8,4 Clocks/Step) 1001-16th note triplets (4 Clocks/Step) 1010-32nd note (3 Clocks/Step) 1011-32nd note triplets (2 Clocks/Step) 1100-64th note triplets (1 Clocks/Step)
	$7b (123)=SeqClockDivide	0000xxxx	xxxx= 0000-Half Note (48 Clocks/Step) 0001-Quarter note (24 Clocks/Step) 0010-8th note (12 Clocks/Step) 0011-8th note, half swing (14,10 Clocks/Step) 0100-8th note, full swing (16,8 Clocks/Step) 0101-8th note triplets (8 Clocks/Step) 0110-16th note (6 Clocks/Step) 0111-16th note, half swing (7,5 Clocks/Step) 1000-16th note, full swing (8,4 Clocks/Step) 1001-16th note triplets (4 Clocks/Step) 1010-32nd note (3 Clocks/Step) 1011-32nd note triplets (2 Clocks/Step) 1100-64th note triplets (1 Clocks/Step)
	$7e (126) Analog Feel Level	0xxxxxxx	x = Range $00-$7f (0-127)

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$7f (127) Bend Range	0xxxxxxx	x = Range $00-$7f (0-127) (127=±1 Octave)
$05 (5) Request Tone Dump Bank + Tone	$01 (1) - Bank Number	000000xx	xx = 0 for Tones 1-128 1 for Tones 129-256 2 for Tones 257-384 3 for Tones 385-512 4 for Tones 513-640 5 for Tones 641-768 6 for Tones 769-896 7 for Tones 897-1024 8 for Tones 1025-1152 9 for Tones 1153-1280 10 for Tones 1281-1408 11 for Tones 1409-1536
WARNING! This command will overwrite the current sounding Tone with the Tone selected	$02 (2) - Tone Number	0xxxxxxx	x = 0-127 Kiwi-1000 transmits a $06 (6) command
$06 (6) Transmit/Receive Tone Dump Bank + Tone + 256 data bytes	$01 (1) - Bank Number	000000xx	xx = 0 for Tones 1-128 1 for Tones 129-256 2 for Tones 257-384 3 for Tones 385-512 4 for Tones 513-640 5 for Tones 641-768 6 for Tones 769-896 7 for Tones 897-1024 8 for Tones 1025-1152 9 for Tones 1153-1280 10 for Tones 1281-1408 11 for Tones 1409-1536
WARNING! This command will overwrite the current sounding Tone with the Tone selected	$02 (2) - Tone Number	0xxxxxxx	x = 0-127 for Tone 1-128 Kiwi-1000 transmits data in the same format as the $04 Command
$09 (9) Request Seq Dump Seq Number	$01 (1) - Sequence Number	000xxxxx	x = 0-23 for Sequence 1-24 Seq # 0-7 Kiwi-1000 transmits a $0a (10) command with 1659 data bytes for seq 0-7
WARNING! This command will overwrite the current sounding Seq with the Seq selected			
$0a (10)Transmit / Receive Seq Dump Seq Number + 1659 data bytes	$01 (1) - Sequence Number	000xxxxx	x = 0-23 for Sequence 1-24 Seq # 0-7 Kiwi-1000 transmits a $0a (10) command with 1659 data bytes for seq 0-7

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
WARNING! This command will overwrite the current sounding Seq with the Seq selected	$00-$13 (0-19) = Seq Name	20 Ascii Bytes	Sequence Name
	$14 (20) = Seq Length	0xxxxxxx	x = 0 = No Seq Recorded 1-124 = No of Seq Steps for seq 0-7
	$15-$2e (21-46) = Reserved		26 bytes Reserved for future expansion
	$2f-$67b (47-1659) = Seq Steps	124 x 13 (1612) or 32 x 13 (416) Note 1 0xxxxxxx Note 2 0xxxxxxx Note 3 0xxxxxxx Note 4 0xxxxxxx Note 5 0xxxxxxx Note 6 0xxxxxxx Byte 7 00abcdef Byte 8 0xxxxxxx Byte 9 0xxxxxxx Byte 10 0xxxxxxx Byte 11 0xxxxxxx Byte 12 0xxxxxxx Byte 13 0xxxxxxx	Step is 13 bytes Byte 1-6 xxxxxxx = note number (32-96) Note Bytes are $00 (0) if not used Byte 7 a-f is tie bits 1-6 (set if tie set) Byte 8-13 xxxxxxx = voice 1-6 Level (0-127) Seq 0-7 can have a maximum of 124 steps
$0d (13) Request Edit Buffer Tone Parameter Param Number	$01 (1) - Tone Parameter Number Data format the same as $04 Parameter Number is Data Posn	0xxxxxxx	x = Data Offset Use Data Position for Parameter Number e.g. $25=DCO12Mix Kiwi-1000 transmits a $0e (14) command
$0e (14) Transmit / Receive Edit Buffer Tone Parameter Param # + 2 data bytes	$01 (1) - Tone Parameter Number Data format the same as $04 Parameter Number is Data Posn	0xxxxxxx	x = Data Offset Use Data Position for Parameter Number e.g. $25=DCO12Mix Kiwi-1000 transmits a $0e (14) command
	$02 (2) - Parameter Value (Hi)	000xxxxx	Data format depends on Parameter Data format the same as $04 Note – This byte is $00 for all non 12 bit parameters
	$03 (3) - Parameter Value (Lo)	0yyyyyyy	Hi & Lo are combined to make single 12 bit command. 000xxxxx + 0yyyyyyy = 0000xxxx xyyyyyyy

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
$0f (15) Request Global Parameter Global Param Number	$00 (0) - Global Parameter Number	000xxxxx	x = Data Offset Use Data Position for Parameter Number Data format the same as $02 e.g. $00 (0) = Midi Channel In Note – reply will be 2 data bytes for all 12 bit returns and 2 bytes with a leading $00 for all others
$10 (16) Transmit / Receive Global Parameter Global Param Number + 2 data bytes	$00 (0) - Global Parameter Number	000xxxxx	x = Data Offset Use Data Position for Parameter Number Data format the same as $02 e.g. $00 (0) = Midi Channel In
	$01 (1) - Parameter Value (Hi)	000xxxxx	Data format depends on Parameter Data format the same as $04 Note – This byte is $00 for all non 12 bit parameters
	$02 (2) - Parameter Value (Lo)	0yyyyyyy	Hi & Lo are combined to make single 12 bit command. 000xxxxx + 0yyyyyyy = 0000xxxx xyyyyyyy

Table 2

Matrix Source Types			Matrix Destination Types	
0	Off		0	Off
1	Bend Up		1	DCO1 Freq *
2	Bend Down		2	DCO2 Freq *
3	Bend Full		3	All DCO Freq *
4	Midi Mod		4	DCO1 Wave **
5	Key Down Velocity		5	DCO1 Wave Shape *
6	Key Note		6	DCO1 Range **
7	LFO1 (bipolar)		7	DCO1 Pulse Width *
8	LFO1 (unipolar)		8	DCO1 Pulse Width Modulation **
9	LFO2 (bipolar)		9	DCO2 Wave **
10	LFO2 (unipolar)		10	DCO2 Wave Shape *
11	LFO3 (bipolar)		11	DCO2 Range **
12	LFO3 (unipolar)		12	DCO2 Pulse Width *
13	ENV1		13	DCO2 Pulse Width Modulation **
14	ENV2		14	DCO Mix Level *
15	ENV3		15	DCO Detune **
16	MidiCC#1		16	VCF Cutoff *
17	MidiCC#2		17	VCF Resonance *
18	MidiCC#3		18	VCF FM *
19	MidiCC#4		19	VCF FM Modulation **
20	MidiCC#5		20	VCA Level *
21	MidiCC#6		21	Portamento Rate **
22	Midi Channel After Touch		22	LFO1 Rate **
23	Midi Note After Touch		23	LFO2 Rate **
24	Keyboard Gate		24	LFO3 Rate **
25	Hold Pedal		25	ENV1 Attack Rate **
			26	ENV1 Decay Rate **
			27	ENV1 Release Rate **
			28	ENV2 Attack Rate **
			29	ENV2 Decay Rate **
			30	ENV2 Release Rate **
			31	ENV3 Attack Rate **
			32	ENV3 Decay Rate **
			33	ENV3 Release Rate **

* = Individual Voices
** = All voices only – This will used Loudest or Highest value from all the voices