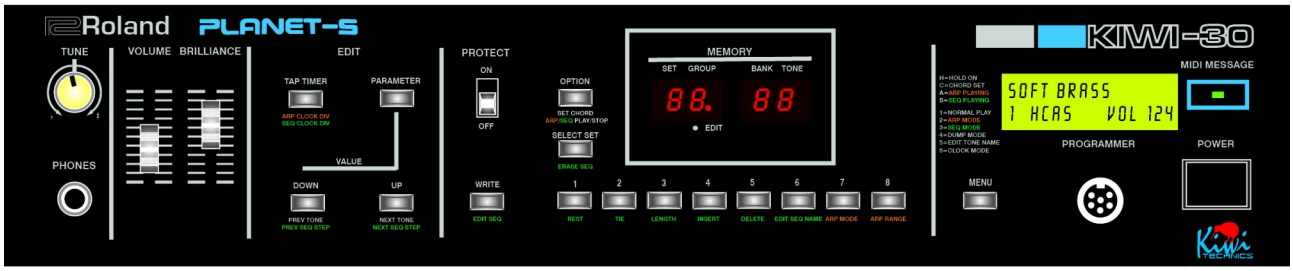
KIWI-30

KIWITECHNICS UPGRADE



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Kiwi-30 Features

- 1536 Tones in 3 sets of 512 can be stored and edited. It is also possible to temporarily edit any Tone.
- Tones can be edited using the front panel or midi.
- Tones are stored in Flash memory so no battery is required.
- Midi Through is converted to Midi Out so Dumps can be saved and midi clock generated.
- MidiCC & Sysex support for all parameters and Midi Sysex support for Tone Dump & Load. The Kiwi30 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. These have 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.
- Polyphonic Aftertouch
- Guitar Mode where midi channels 1-6 control voices individually.

CHORD MODE

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

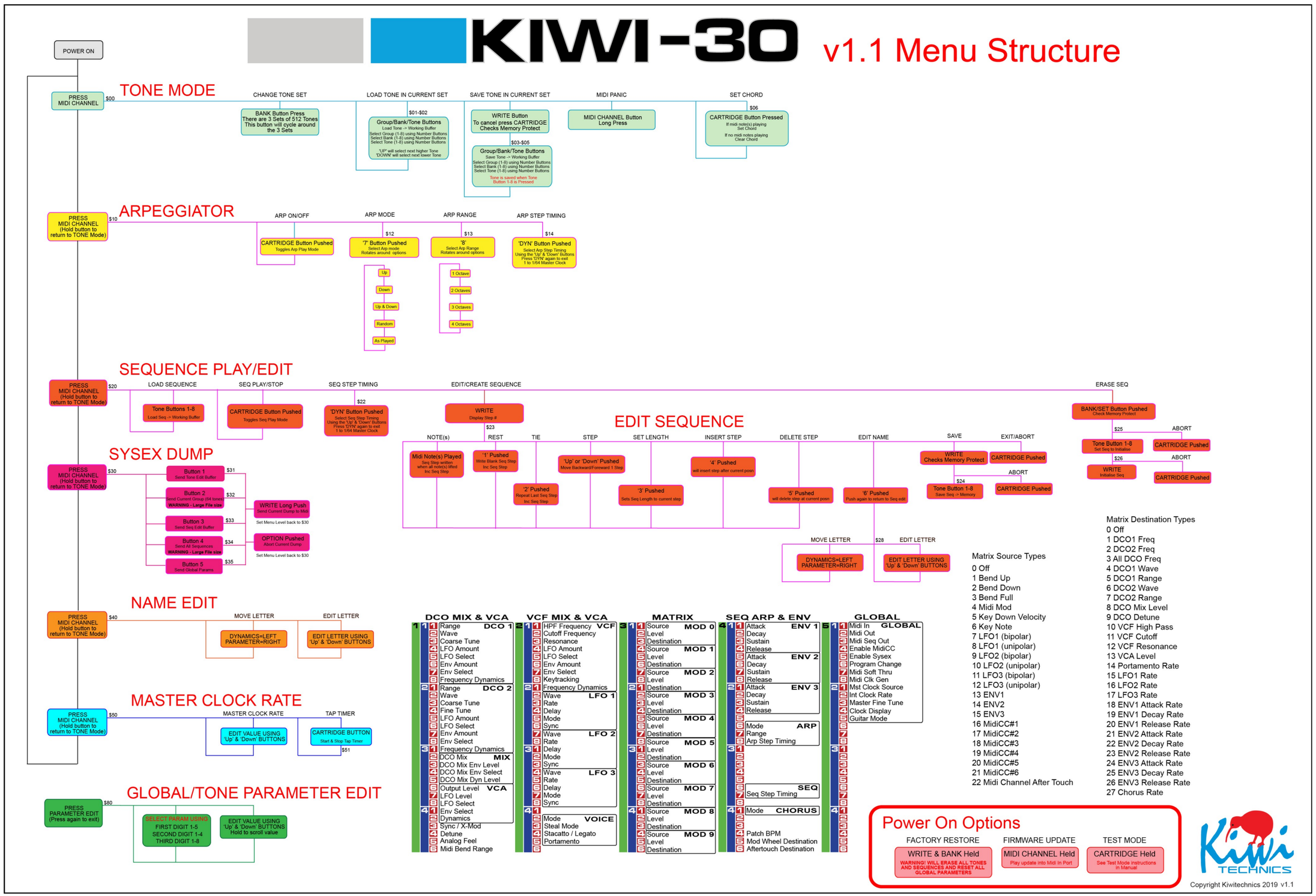
ARPEGGIATOR

- 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

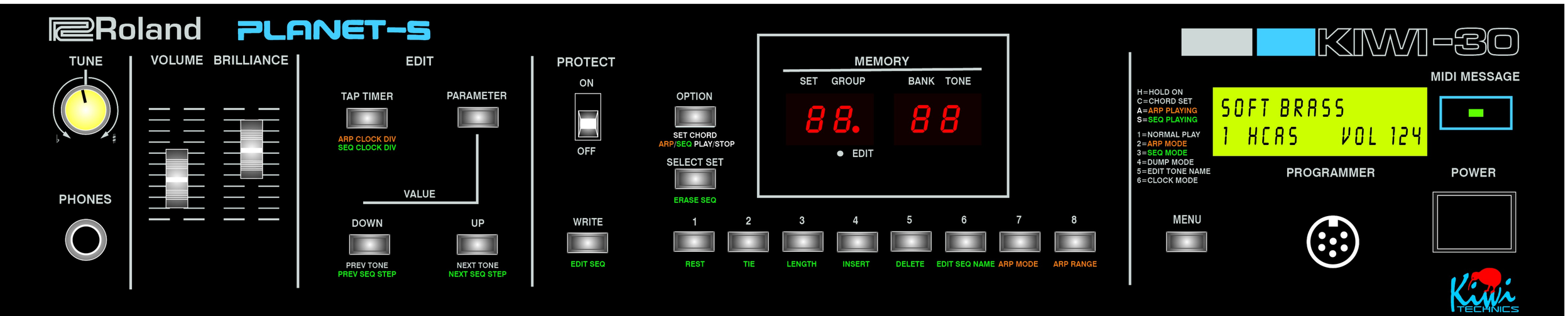
SEQUENCER

- 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

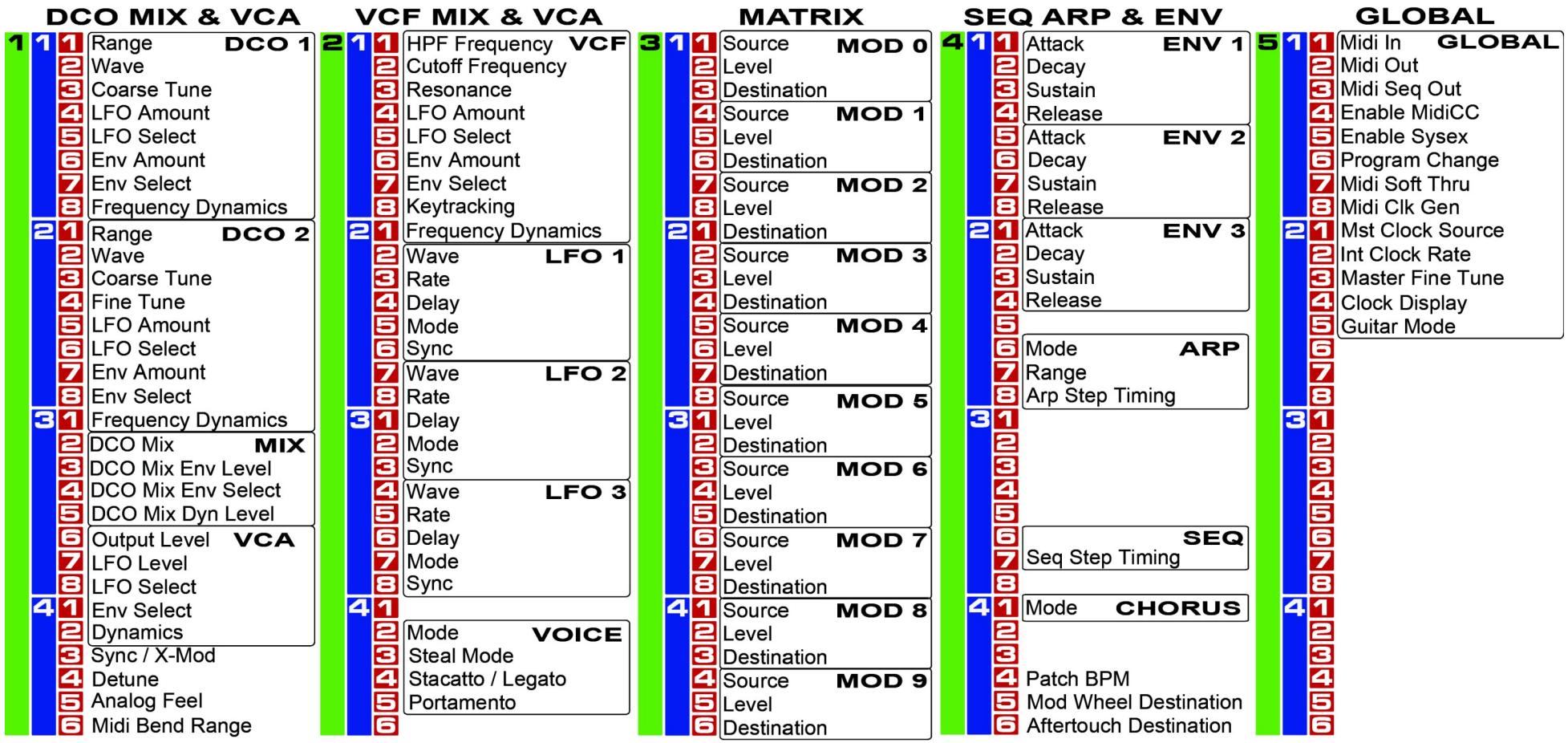
Kiwi 30 Flow Chart



Kiwi 30 Front Panel



Kiwi 30 Parameter Edit Map



Front Panel Description

The Kiwi-30 front panel differs from the original MKS-30 and the Kiwi-30 Upgrade redefines many of the buttons on the Roland MKS-30. Many of the buttons have been assigned new or multiple functions and others now operate differently.

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

Because of the number of parameters in the Kiwi-30 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 418 which is ENV2 Release Rate.

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

Kiwi-30 BUTTONS

MIDI CHANNEL

The Button Labeled “MIDI CHANNEL” is used to select the MODE of the Kiwi-30. The Kiwi-30 has six modes of operation. The Mode the Kiwi-30 is currently in is shown on the left of the bottom line of the display on the front panel (1 to 6).

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.

There are 3 SETs of 512 Tones making a total of 1536 Tones in memory. Pressing BANK will increment the current Set number from 1->3 and then this will loop back to 1. The left most LED digit displays the current Set number.

Each Tone within a Set has a four number identification in the form 3:3:2:1. The First digit is the Set number, the second is the Group number, the third is the Bank and the forth is the Tone. The lowest tone number is 1:1:1:1 and the highest is 3:8:8:8. These are displayed from left to right on the four front panel digits.

The UP & DOWN buttons will step to the Next & Previous Tones. If Next is pressed with Tone 3:8:8:8 showing the next tone will step to 1:1:1:1.
The CARTRIDGE button is used to set and clear a Chord. If notes are playing when this button is pressed a Chord will be set. If no notes are being played when this button is pressed then the Chord will be cleared.

5 - NAME EDIT

The Name of the currently loaded Tone can be edited using the following keys.
Dynamics = Move LEFT to next letter
Parameter = Move RIGHT
Up/Down = Change letter

2 - ARP Mode

The 'CARTRIDGE' Button will start and stop the ARP playing.
Tone Button '7' sets Arp Mode
Tone Button '8' sets Arp Range

3 - SEQ Mode

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

The TONE buttons '1-8' will load the sequence stored under that number into the edit buffer.
Pressing the 'WRITE' button will enter Seq Edit Mode. Details about Seq Edit Mode can be found in the Sequence section of the manual.

4 - DUMP Mode

Five different dumps are available.
1) CURRENT TONE. Button '1' followed by the 'WRITE' button will dump the currentl TONE.

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

2) CURRENT GROUP. Tone Button '2' followed by the 'WRITE' button will dump the 64 tones in the current Group. This is a large dump.

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

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

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

6 - CLOCK

The Internal Master Clock rate can be set using the UP & DOWN buttons. The range is from 5 to 299 BPM. The 'DYNAMICS' button can be used to set a TAP TIMER while in this mode.

Kiwi-30 BUTTONS		
PARAMETER BUTTON	Parameter 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 UP & DOWN buttons. Holding down the UP or DOWN buttons will scroll the value at a faster rate. If you are editing using midi or the PG200 the edits will also show on the display.	
CARTRIDGE BUTTON	The 'CARTRIDGE' button has different operations depending on the mode the Kiwi-30 is currently in. While in TONE Mode the 'CARTRIDGE' button will act as a SET/CLEAR CHORD. If notes are playing when this is pushed a Chord will be set. If no notes are playing the 'CARTRIDGE' is pushed the Chord will be cleared. While in ARP Mode the 'CARTRIDGE' button will start and stop the ARP playing. While the ARP is playing 'A' will show on the display in Mode 1.	While in SEQ Mode the 'CARTRIDGE' button will start and stop the SEQ playing. While the SEQ is playing 'S' will show on the display in Mode 1 and Seq Step will display in Mode 3. The 'CARTRIDGE' button is used as ABORT during SEQ EDIT, SEQ SAVE, SEQ ERASE or SYSEX DUMP.

Kiwi-30 BUTTONS

WRITE BUTTON

The 'WRITE' button has different operations depending on the mode the Kiwi-30 is currently in.

For writing a Tone to permanent memory in normal play mode press 'WRITE' then enter the Set, Group, Bank and Tone number (1111-3888). 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 press 'WRITE' (while in Seq Edit Mode) followed by Tone 1-8.

When the Kiwi-30 is in DUMP mode a press of the 'WRITE' button is used to start a dump after the dump type has been selected using the '1-5' buttons.

The Kiwi-30 supports loading dumps in from the following dump formats. Roland MKS-30, Roland JX-8P, JX-10 & MKS-70, Kiwi-30, Kiwi-8P, Kiwi-1000 & 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.

UP/DOWN BUTTONS

The 'UP' and 'DOWN' buttons have different operations depending on the mode the Kiwi-30 is currently in.

TONE MODE (Menu Level 1)
The 'UP' & 'DOWN' buttons will step (and load) the current Tone up or down. i.e. if Tone #1112 is playing tone #1113 will load and sound if 'UP' is pressed.

ARP MODE (Menu Level 2)
The 'UP' & 'DOWN' button will edit the ARP Step Timing if the DYNAMICS button has been pressed while in ARP Mode. Press the DYNAMICS button again to exit this mode.

SEQ EDIT MODE (Menu Level 3)
The 'UP' & 'DOWN' button will edit the SEQ Step Timing if the DYNAMICS button has been pressed while in SEQ Mode. Press the DYNAMICS button again to exit this mode.

NAME EDIT MODE (Menu Level 5)
The 'UP' & 'DOWN' buttons will step the letter being edited which will flash on the display. The DYNAMICS button will step the letter being edited to the LEFT and PARAMETER button will step the letter being edited to the RIGHT.

CLOCK MODE (Menu Level 6)
The 'UP' & 'DOWN' 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.

PARAMETER EDIT MODE
The 'UP' & 'DOWN' buttons will step the value of the selected Parameter. Holding down the Up or Down button will scroll the value at a faster rate.

Kiwi-30 BUTTONS

BUTTONS '1' to '8'

The buttons '1-8' have different operations depending on the mode the Kiwi-30 is currently in.

TONE MODE (Menu 1)
The '1-8' buttons are used to select a Tone to Load. Tones have numbers starting at 1111 and ending at 3888. e.g. to load tone number 2251 press SET until '2' shows on the display, press '2' then '5' then '1' using the 1-8 buttons. Use the 'UP' & 'DOWN' buttons or midi commands to quickly step between Tones.

ARP MODE (Menu 2)
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 'DYN' button is used to edit the ARP clock division. To change the ARP Step Timing press 'DYN', change the value using the 'UP' & 'DOWN' buttons then press the 'DYN' 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 (Menu 3)
The buttons '1-8' will load a sequence from memory to the seq edit buffer.

SEQ ERASE
The BANK (SET) button is used to Erase or Clear a sequence. While in SEQ MODE press BANK followed by the seq number '1-8' followed by a long press of the WRITE button.

SEQ EDIT MODE
The buttons '1-5' are used to create and edit a sequence. Details of sequence edit button use are in the Sequencer section of the manual.

DUMP MODE (Menu 4)
The '1-5' buttons are used to select a dump type. The dump will not begin until the 'WRITE' button is pressed.

PARAMETER EDIT MODE
The number buttons are used to select the parameter to edit. e.g. the number 112 will select the DCO1 Wave parameter. The parameter numbers can be found on the edit map and the parameter edit section of the manual.

Kiwi-30 Upgrade Notes

## Digital Oscillators	The MKS-30 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 MKS-30 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, Env 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. The number of steps halves for each octave. The Octave select for each voice changes the clock going to the dividers so the actual steps between frequencies can vary for any given frequency. As an example if you have 16' set, the tune knob set to +12 and playing high notes the stepping will be worse than using 4', tune -12 and playing lower notes. While the output frequency might be the same the number being fed into the divider chips is not the same and therefore the stepping will not be the same. 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.
## Portamento	Portamento is available in all playing modes.	

Kiwi-30 Upgrade Notes

Display

The Kiwi-30 display provides feedback and instructions that make navigating the menu easier. On normal play the display will show the Tone Name on the top row.

The bottom row contains status information.

Menu Level 1
Example Display

TONE NAME
1 HCAS VOL 124

1 = Menu Level
H = Hold On
C = Chord Set
A = Arp Playing
S = Sequence Playing
VOL is the Tone volume
Note H,C,A & S will only show if the sections are active.

Menu Level 2
Example Display

ARP MODE
2 UP 1OCT PLAY

2 = Menu Level
Mode can be Up, Down, U/D, Random or As Played
Range can be 1-4 Octs
PLAY or STOP will show the current ARP state

Menu Level 3
Example Display

SEQ MODE
3 PLAYING XXX

3 = Menu Level
STOPPED/PLAYING = Seq Mode
XXX = the current Step number

Menu Level 4
Example Display

```
MIDI DUMP <1-5>
4 SEL DUMP TYPE
```

4 = Menu Level
Select dump type 1-5 and press WRITE to start the dump

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 Kiwi-30 is done by holding the 'WRITE' and the 'BANK/SET' buttons down while powering on the synth.

This will wipe all Tones and Seqs in the synth and replace them with 'blank' Tones and Erased Seqs. This will also reset all the Global parameters to there default settings.

Midi Received

Midi data received will flash the MIDI Led if it is recognized by the Kiwi-30.

Kiwi-30 Upgrade Notes

Midi Panic	A long press of the 'MIDI CHANNEL / MENU' button will act as a MIDI PANIC and will cancel any sounding notes.	
Note Hold	The MKS-30 has no Note Hold except when using a hold pedal. In the Kiwi-30 while in Menu Level 1 'H' will show on the display when Hold mode is on.	
Edit Buffer Compare	Whenever the edit buffer does not match the saved Tone showing on the display the right most decimal points on the Set/Group display will flash.	To retain these changes when the Tone is changed or the Kiwi-30 is powered off the Tone must be written to memory. This is done by pressing of the Write button. This is followed by the Set (optional), Group, Bank & Tone numbers entered using BANK/SET button and the buttons 1-8. 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.

Kiwi-30 Upgrade Notes

LFO Generators

The Kiwi-30 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 of the LFOs have their 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.

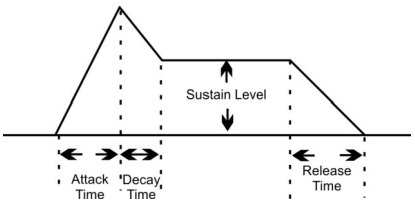
Each LFO can be Normal or Plus mode. Normal will move the base above and below the normal parameter level and plus mode will only move the base level up. Each section of the Kiwi-30 that uses LFO input can select from one of the 3 LFOs.

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 MKS-30 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-30 has three independent Envelope Generators. The Envelopes generated are also available as Matrix sources. Envelopes 1-3 are the traditional ADSR type.



Write Protect

The WRITE PROTECT switch on the front panel of the MKS-30 must be in the OFF position to write to the Kiwi-30 memory.

If a WRITE is attempted with the Write Protect on an error message will display.

Master Tune

The MKS-30 front panel tune knob has a limited range so we have also put in a Global master fine tune that has a slightly larger range.

Both the front panel and the Global master tune are added to effect the overall tune.

Sequencer

The Kiwi-30 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 437 and can also be edited by pressing the 'DYN' 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 '1-8' 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 'DYNAMICS' while in SEQ MODE is a shortcut to editing parameter 437 Seq Step Timing. The step timing is changed using the 'UP' and 'DOWN' button. Press 'DYNAMICS' again to exit this mode.

SEQ ERASE

To Erase a Sequence press the Button 'BANK/SET' 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 1-8 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 'SET/ BANK' button. Next press the Tone button '1-8' corresponding to the sequence you wish to clear. Follow this with the 'WRITE' button which will do the clearing. At any stage before the write pressing the 'CART' 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.

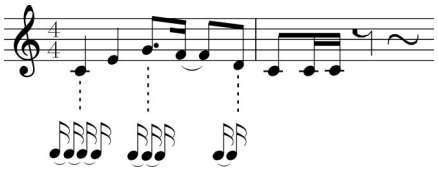
To start editing or creating a sequence press 'WRITE' while in SEQ MODE. **If a sequence contains data when 'WRITE' is pressed then any step(s) you write will overwrite all notes in the existing step(s) already in the sequence.** The 'DOWN' (backwards) and 'UP' (forwards) buttons will allow non destructive 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 press the 'WRITE' button followed by a Tone button (1-8) to Save the Sequence to permanent memory or the 'CART' Button to exit edit mode. The next press of the 'CART' 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-30 is powered off or another sequence is loaded. Pressing the 'CART' button again will stop the sequence playing (refer to **Sequencer Playing** in the next section).

When a sequence is playing the seq current step show on the display while in SEQ MODE.

Sequencer Writing / Editing

Button use in detail while in SEQ EDIT MODE

Button '1' – Rest

When the Button '1' 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 '2' – Tie

When the Button '2' 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 'DOWN' – Step Back

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

Button 'UP' – Step Forward

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

Button '3' – Set Length

When the Button '3' 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 DOWN and UP buttons and then press the '3' the sequence will now be A, B, C only.

Button '4' – Insert Step

When the '4' 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 '4' button is pressed.

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

Button '5' – Delete Step

When the '5' 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 by pressing one of the 8 Tone buttons '1-8'. The Sequence that is stored under the Tone button selected will be loaded to memory

If you press the 'CART' button while in SEQ MODE 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 'CART' 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.

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

It is possible to play along with the sequencer. The Kiwi-30 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 243 (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-30 Upgrade has a built in Arpeggiator that can be applied to any sound.

Arpeggiator Mode is started and stopped by pressing the 'CART' 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 428 Edit. There are 13 different ratios including swing options. The Arp Clock Source parameter is located under 428 or by using the 'DYN' button and the 'UP'/'DOWN' 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 displayed and 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 'CART' 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 CART 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 CART Button while the chord keys are pressed. **Canceling Chord Mode.** To cancel chord mode press and release the CART Button in TONE MODE (Menu Level 1) 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 212 for VCF Cutoff for example. To edit this parameter press PARAMETER, Button '2' then Button '1' then Button '2'. Then edit the value using the 'UP' & 'DOWN' buttons. Holding down the Up or Down buttons will speed up the changes.
DCO Parameters	111 – DCO 1 Range 121 – DCO 2 Range	Options are 64', 32',16', 8', 4' or 2'
	112 – DCO 1 Wave 122 – DCO 2 Wave	Options are Saw, Tri, Pulse or a combination of Pulse & Saw or Tri, DCO2 only can have Noise
	113 – DCO 1 Course Tune 123 – DCO 2 Course Tune	Range is ± 1 Octave in half tone steps
	124 – DCO 2 Fine Tune	Range is ± 50 Cents
	114 – DCO 1 LFO Amount 125 – DCO 2 LFO Amount	Range is 0-127
	115 – DCO 1 LFO Select 126 – DCO 2 LFO Select	Options are LFO1, 2 or 3 and normal or inverted
	116 – DCO 1 ENV Amount 127 – DCO 2 ENV Amount	Range is 0-127
	117 – DCO 1 ENV Select 128 – DCO 2 ENV Select	Options are ENV1,2 or 3 and normal or inverted
	118 – DCO 1 ENV Dynamics 131 – DCO 2 ENV Dynamics	Range is 0-127 Key velocity effects DCO Env Amount.
	132 – DCO 1/2 Mix	Range is 0-127. 0 is DCO1 only
	133 – DCO Mix Envelope Level	Range is 0-127
	134 – DCO Mix Envelope Select	Options are ENV1,2,3 (normal or inverted) or LFO1,2,3
	135 – DCO Mix Dynamics Level	Range is 0-127 Key velocity effects Mix Env Amount
	143 – X Mod	Options are Off, Sync 1, Sync 2, XMod
	144 - DCO Detune	Range is 0-127
	145 - Analog Feel	Range is 0-127
	146 – Midi Bend Range	Range is 0-127 (127=1 Oct)
VCF Parameters	211 – HPF Cutoff	Range is 0-127
	212 – VCF Cutoff	Range is 0-127
	213 – VCF Resonance	Range is 0-127
	214 – VCF LFO	Range is 0-127
	215 – VCF LFO Select	Options are LFO1, 2 or 3
	216 – VCF Envelope Level	Range is 0-127
	217 – VCF Envelope Select	Options are ENV1,2 or 3
	218 – VCF Key	Range is 0-127
	221 – VCF Dynamics	Range is 0-127

Parameter Editing

LFO Parameters

222 – LFO 1 Wave	Options are 1=Sine, 2=Triangle, 3=Square, 4=Saw, 5=Rev Saw, 6=Random, 7=Fast Random
223 – LFO 1 Rate	Range is 0-127
224 – LFO 1 Delay	Range is 0-127
225 – LFO 1 Mode	Options are Normal or Plus Normal will raise and lower parameter being edited and Plus will only raise the parameter being edited
226 – LFO 1 Sync	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)
227 – LFO 2 Wave	Options are 1=Sine, 2=Triangle, 3=Square, 4=Saw, 5=Rev Saw, 6=Random, 7=Fast Random
228 – LFO 2 Rate	Range is 0-127
231 – LFO 2 Delay	Range is 0-127
232 – LFO 2 Mode	Options are Normal or Plus
233 – LFO 2 Sync	Options are the same as LFO1
234 – LFO 3 Wave	Options are 1=Sine, 2=Triangle, 3=Square, 4=Saw, 5=Rev Saw, 6=Random, 7=Fast Random
235 – LFO 3 Rate	Range is 0-127
236 – LFO 3 Delay	Range is 0-127
237 – LFO 3 Mode	Options are Normal or Plus
238 – LFO 3 Sync	Options are the same as LFO1

Parameter Editing

Modulation Matrix	311 – Matrix 0 Source 314 – Matrix 1 Source 317 – Matrix 2 Source 322 – Matrix 3 Source 325 – Matrix 4 Source 328 – Matrix 5 Source 333 – Matrix 6 Source 336 – Matrix 7 Source 341 – Matrix 8 Source 344 – 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
	312 – Matrix 0 Level 315 – Matrix 1 Level 318 – Matrix 2 Level 323 – Matrix 3 Level 326 – Matrix 4 Level 331 – Matrix 5 Level 334 – Matrix 6 Level 337 – Matrix 7 Level 342 – Matrix 8 Level 345 – Matrix 9 Level	Range is 0-127
	313 – Matrix 0 Destination 316 – Matrix 1 Destination 321 – Matrix 2 Destination 325 – Matrix 3 Destination 328 – Matrix 4 Destination 332 – Matrix 5 Destination 335 – Matrix 6 Destination 338 – Matrix 7 Destination 343 – Matrix 8 Destination 436 – 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=DCO2 Range 7=DCO2 Wave 8=DCO Mix 9=Detune amount 10=HPF Cutoff 11=VCF Cutoff 12=VCF Resonance 13=VCA Level 14=Port Rate 15=LFO1 Rate 16=LFO2 Rate 17=LFO3 Rate 18=ENV1 Attack Rate 19=ENV1 Decay Rate 20=ENV1 Release Rate 21=ENV2 Attack Rate 22=ENV2 Decay Rate 23=ENV2 Release Rate 24=ENV3 Attack Rate 25=ENV3 Decay Rate 26=ENV3 Release Rate

Parameter Editing		
VCA Output Level	136 VCA Output Level	Range 0-127
VCA LFO Level	137 VCA LFO Level	Range 0-127
VCA LFO Select	138 VCA LFO Select	Options are LFO 1-3 Normal or Inverted
VCA ENV Select	141 VCA ENV Select	Options are Gate, ENV 1, 2 or 3
VCA Dynamics	142 VCA Dynamics Level	Range 0-127
Voice Mode	242 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	243 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

Parameter Editing		
Voice Mode Staccato	244 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	144 DCO Detune	Range 0-127. DCO Detune will have no effect on Solo keying
Analogue Feel	145 Analogue Feel	This parameter injects a very subtle random tune adjusts to each note. This is changed each time a note is played.
Seq One Shot	432 Sequence One Shot	Options are Off or On. This parameter controls whether a seq will play once and stop (On) or continuously loop (Off)
Seq Key Down Play	433 Sequence Key Down Play	Options are Off or On. Off = The Sequence will always play when the Sequence button is on On = The Sequence will only play when the Sequence Play button is enabled and a key is being played. Use this option with parameter 435 to control how a sequence finishes.
Seq Auto Transpose	434 Sequence Auto Transpose	Options are Off or On. When on this parameter will transpose the sequence tune to a key being played.
Seq Auto Trans Reset	435 Sequence Auto Trans Reset	Options are Off or On. This parameter is used with Parameter 433 and will make Sequence Transpose temporary (off) or latched (on). When the transpose is temporary the sequence will revert back to the programmed tune as soon as the transpose key is lifted.
Sequence Complete	436 Sequence Complete	Options are Off or On. This is used in conjunction with the Key Down play option. When Sequence Complete is Off the sequence will stop immediately when the key is lifted. When SC is set on the Sequence will run to the point where it loops back to the start and then finish.

Parameter Editing

SEQ Step Timing	437 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	444 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	426 Arp Mode	The ARP MODE options are UP only DOWN only UP & DOWN RANDOM AS PLAYED
ARP Range	427 Arp Range	The ARP Range options are 1-4 Octaves
ARP Step Timing	428 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	411 – 414 Env 1 ADSR 415 – 418 Env 2 ADSR 421 – 424 Env 3 ADSR	Range is 0-127
Chorus	441 – Chorus Mode	Options are Off, On

Global Parameters Edit		
Midi In Channel	511 Midi In Channel	Range is 1-16 or 17=Omni
Midi Out Channel	512 Midi Out Channel	Range is 1-16
Seq Midi Out Channel	513 Seq Midi Out Channel	Range is 1-16
Enable MidiCC	514 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	515 Enable Midi Sysex	Options are Off – No Midi Sysex On – Sysex Receive Enabled
Enable Program Change	516 Enable Program Change	Options are Off – No Program Change On – Midi Program Change Enabled
Midi Soft Through	517 Midi Soft Through	Options are Off – Stop All 1 – Pass All 2 – Pass Only nonCC 3 – Stop Only used MidiCC
Midi Clock Gen	518 Midi Clock Generation	Options are Off, On The Kiwi-30 will output a midi clock which is set by the internal clock rate when this parameter is set On
Master Clock Source	521 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	522 Master Clock Rate	Range is 0-127 which is 5-299 BPM
Master Fine Tune	523 Master Fine Tune	Range is 0-127 64=A440
Clock Display	524 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	525 Guitar Mode	Options are Off, On When Guitar mode is on midi notes and midi bend on channels 1-6 only will sound voices 1-6.

Tone Dump Importing

Tone Dump Imports

The Kiwitechnics Kiwi30 upgrade is capable of loading in Kiwi30, 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 Kiwi30.

There are some caviates though. Because the tone layout and sound generation in the Kiwi30 is not the same as the synths being imported it is not possible to get the tones sounding exactly the same by a simple conversion.

Some OB M1000 tone dumps contain names that are in the form 'BNKx: yz'. When these are encounted the tone number is calculated as follows. X is multiplied x 100, Y is multiplied by 10 and these are added to Z. The result of this can be 000-999.

Other tone dumps are also converted into a single number in similar ways. A Roland tone would be (Group x 64) + (Bank x 8) + Tone.

Once this number has been found it is converted into the format that the MKS-30 uses. The number is divided by 512 and the result is the Set number (1-3), then the remainder is divided by 64 and the result is the Group Number (1-8), then the remainder is divided by 8 and the result is the Bank Number (1-8) and what is left is the Tone number (1-8).

An example would be the M1000 tone number 721 will end up in 2:4:3:2 (S:G:B:T).

WARNING - Tones dumps have to ability to quickly overwrite large numbers of existing tones.

WARNING – 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 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 keyboard 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 Kiwi30 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

While every effort has been made to make the midi as fast as is possible within the KiwiTechnics Kiwi-30 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

When a midi hold is received 'H' will show on Menu Level 1 while the hold is on.

Using the PG-200

	The PG200 controller can be used with the Kiwi30 Upgrade. Because the way the Kiwi30 processes DCO1 & 2 LFO & Envelopes not all the PG200 parameters work as shown on the PG200 panel. The DCO LFO & ENV controls will only control DCO1 and the DCO1 & 2 LFO, ENV and invert switches will have no effect. All the other controls will work correctly.	

Firmware Updates

	Firmware Updates The Kiwi-30 is put into update mode by pressing and holding the MIDI CHANNEL button as the Kiwi-30 is powered on. The update file can then be played into the Midi In port. As the files are playing into the Kiwi-30 the Digit Leds will cycle. If the update has no errors then ' gd' will display on the digits. 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 large 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.

Test Mode

Test Mode

The Kiwi-30 is put into TEST mode by pressing and holding the CARTRIDGE button at the same time as the Kiwi-30 is powered on until 'TEST MODE' shows on the display.

Note – Warm up the M30 for 30mins to stabilize the audio path electronics before running the Calibration.

The 6 test modes are accessed using the Tone buttons. During test mode The voice that is sounding will show on the red LED digits. There are six short bars and when a note is pressed a tall bar shows.

The first adjustment is the VREF. Using an accurate DVM connect to DG and TP2 (located to the left of L1 and the battery on the main board). Adjust VR6 (Near L1) until the VREF pin measures +4.70 volts.

Test Mode 1
This is used to calibrate the L2 Master Oscillator for DCO1. **Center the TUNE control on the front panel and set the global Fine Tune to zero (0)**. Press note A4 which is just below middle C and tune L2 using a plastic screwdriver until the output is 442Hz. The easiest way is to use a guitar tuner near the speaker or you can put an oscilloscope on the POLY OUT test point on the MKS-30 main board.

Note - If you have to use a metal screwdriver you need to be aware of two things. 1) the ferrite cores are very fragile and the top will chip easily so use the correct sized screwdriver and be very gentle, 2) any metal near the ferrite will alter the tune. So you need to move the screwdriver well away from the ferrite core after each adjustment.

Test Mode 2
This is similar to test mode one but also turns on DCO2. Tune L1 near the rear next to the battery until minimal beating can be heard. It will probably not possible to remove all beating totally so get as close as you can. These Oscillators will also drift tiny amounts with temperature and time and is part of the MKS-30 'charm'.

Test Mode 3
This test sets the output level for each voice. Put a oscilloscope probe onto the POLY OUT test point and test each voice for the same output level. Adjust the level to about 1.5V peak to peak using VR2 next to the filter. The MKS30 manual says to set this to 600mV but we found this is not possible on our 2 test units. The important thing is they are all the same level and not distorting.

Test Mode 4
DC Balance. The voices in this mode are set to not rotate. To change to the next voice press C2. Put a oscilloscope probe onto the POLY OUT test point and repeatedly press a note for each voice and adjust VR4 labeled DCBAL for a minimal DC change on the scope. Change to the next voice by pressing C2.

Test Mode 5
VCF Resonance
For each voice set VR1 for 250mV peak to peak and VR3 for 1KHz. These trims interact and are fairly coarse so just get as close as you can for each voice.

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-30 Upgrade must be installed by a competent technician with the correct tools or damage to your Kiwi-30 can occur.

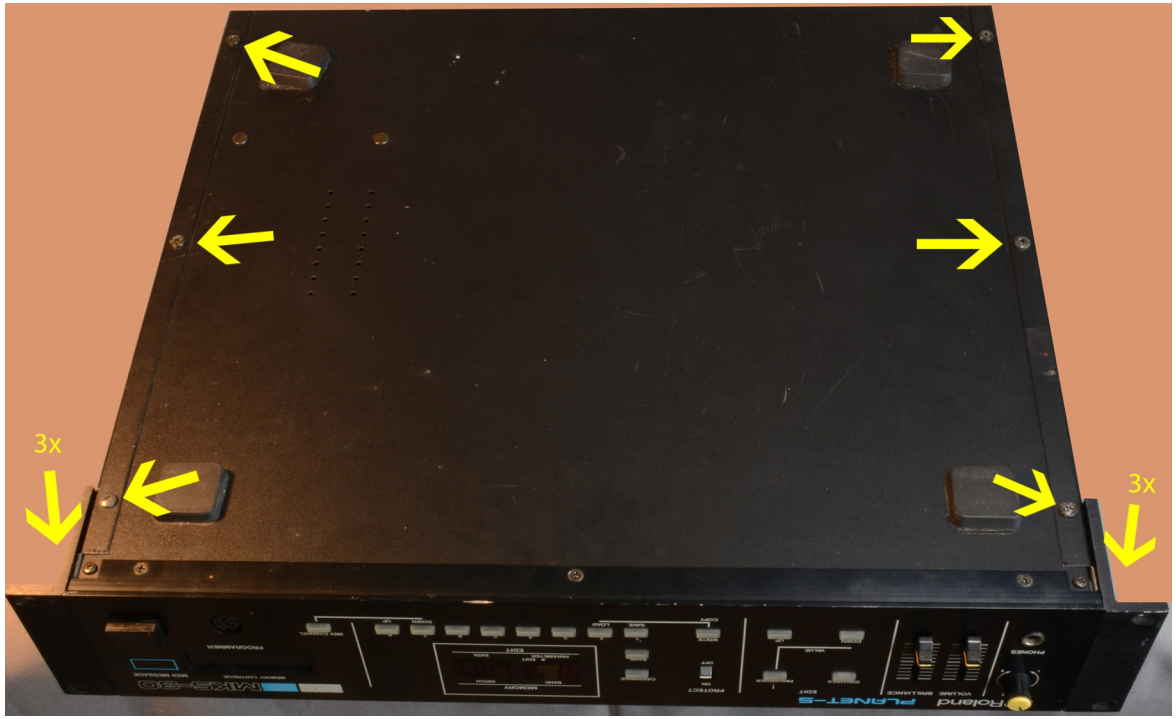
UNPLUG THE MKS-30!

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

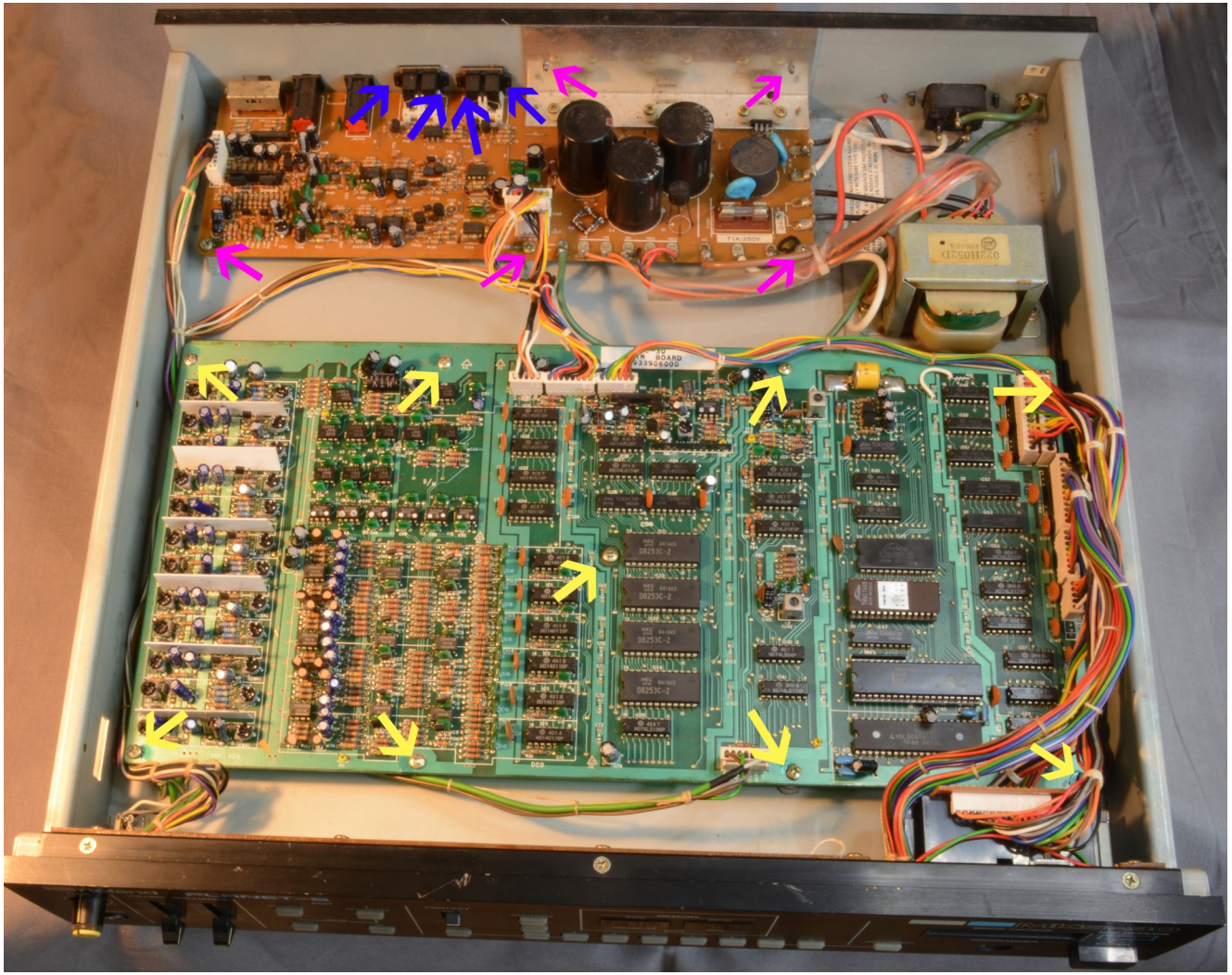
1) The Main Board

On the main board one 40 pin chip and one capacitor and one resistor need to be removed and replaced with a 40 pin socket and a link which are supplied with the KiwiTechnics Kiwi-30 Upgrade. There is also a display board to fit into the CART slot. 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 MKS-30 – Remove the top cover by removing the 3 screws on each side holding on the rack mounts (if fitted), the 6 screws on the underside holding on the top cover. The cover can then be slid towards the rear of the MKS-30 and removed and the cover, rack mounts and screws can then be put to one side.



Step 2) Remove the main board. Remove all the cables that are plugged into the board and the 9 screws (marked with yellow arrows in the photo) holding the board into the MKS-30. Lift out the main board. The Blue and Purple arrows are used in the next section for removing the Jack Board.



Step 3) Desolder IC48 and C145 and fit the supplied 40 pin IC socket and wires.

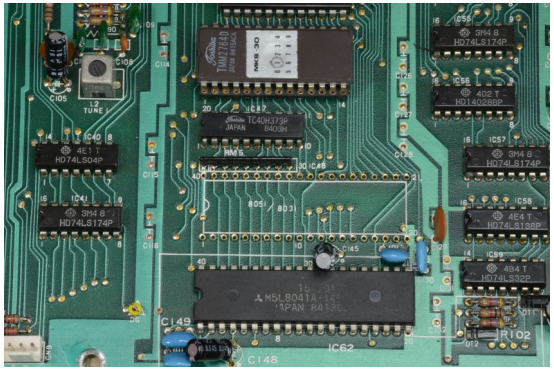
It is very important that this step is done correctly.

On the top side of the voice board underneath the IC (Integrated Circuit) 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.

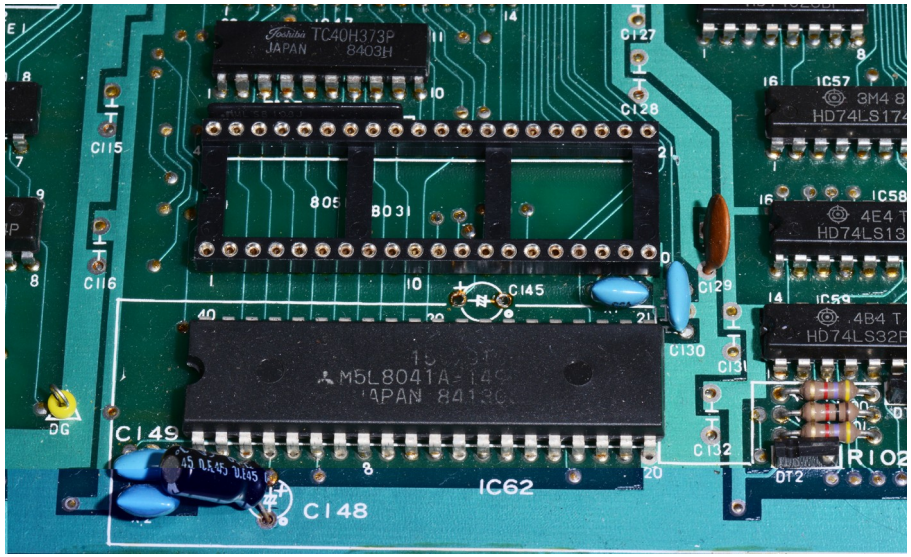
All the solder must be removed from all the 40 holes in the IC and the pins free of the hole edges before the IC is lifted out of the board.

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. The photo shows a Hakko desolderer gun. 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 and is not recommended. 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 let the hole cool and try again. Fresh solder is easier to remove.

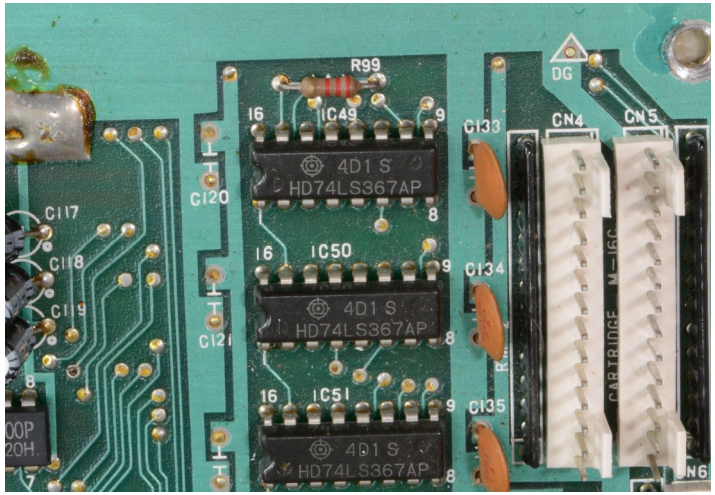
The following IC and parts need to be removed. IC48 (40 pin IC marked 8031 or 8051) and the capacitor right next to it marked C145. These are marked with yellow arrows in the photo. The ROM IC46 is also not required and can be removed if it is in a socket otherwise it can be left as it is ignored by the Kiwi30. The battery is also no longer required and can be removed to prevent any danger of leaking in the future.

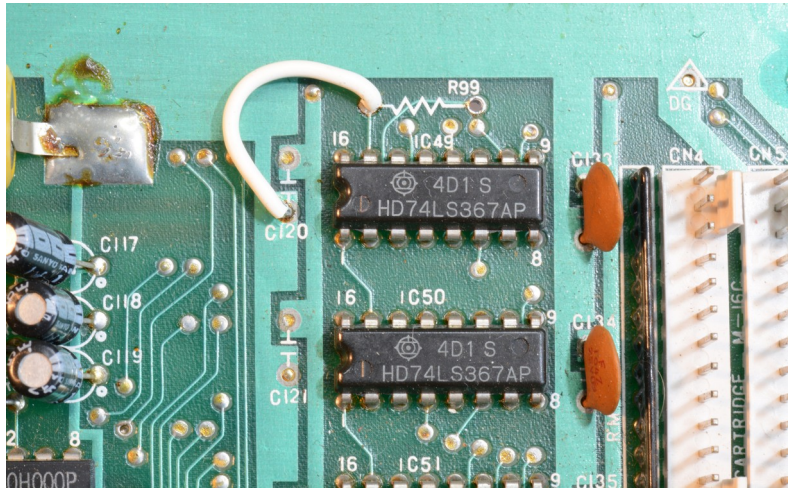


Step 4) Fit the 40pin socket provided into the IC48 area making sure that the notch in the socket is the same orientation as the mark on the board. Check that there are no broken tracks or shorted pins. Bend C148 so that it is a low as possible.

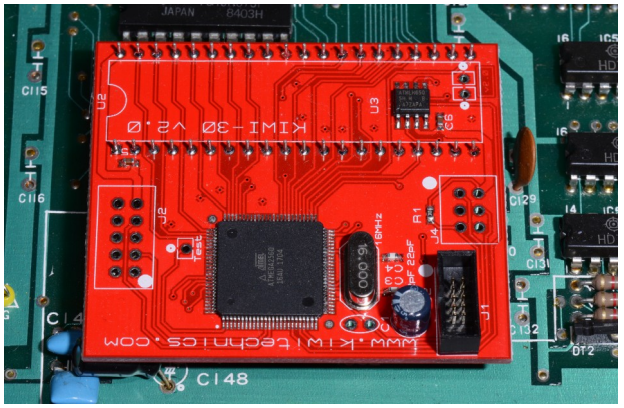


Step 5) Remove R99 and fit the wire provided between the R99 hole and the Ground point marked C120 as shown in the photos.





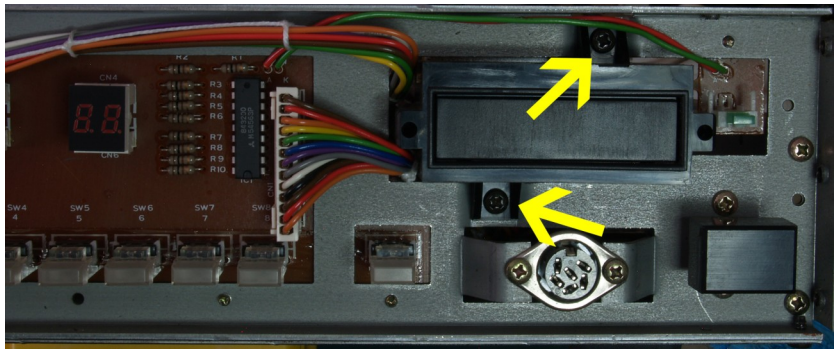
Step 6) When fitting the upgrade board into the socket make sure all the pins are in all the socket holes and press in half way. This will seat the board into the holes. Then with the MKS30 main board on a static free firm surface and something firm directly under the daughter board area you need to 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.



Step 7) On the underside of the main board fit the long midi wire to Pin 6 of CN9 marked “MIDI” on the top side.

Step 8) Refit the main board using the 9 screws removed in step 2. Refit all the cables except for the cables plugged into CN4 through CN8 as these need to be removed to fit the display board.

2) The Display Board

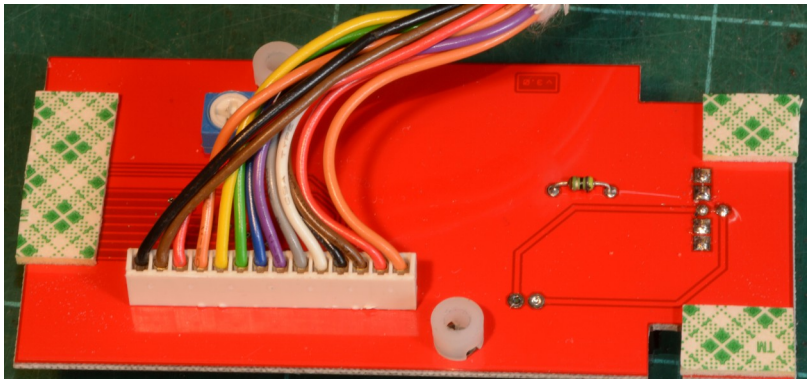


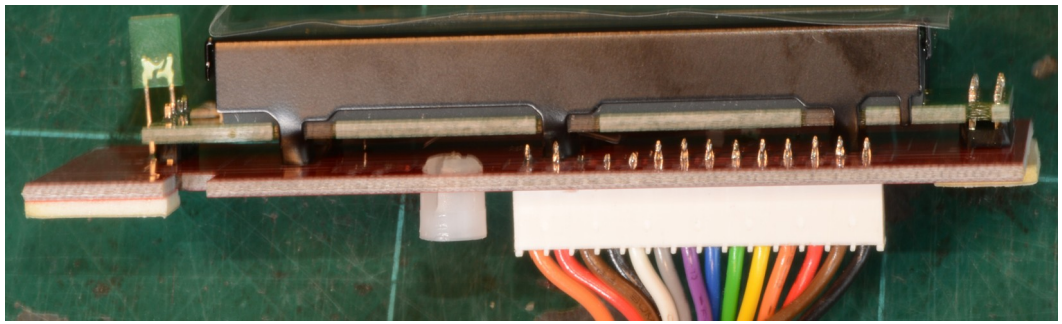
Step 1) Remove the front panel. This involves removing the two slider knobs and the 3 screws on the top and the three screws on the bottom of the front panel. **Note – the top screws and the bottoms screws holding the panel on are different and should not be mixed. The top screws need to be put back into the top when refitting the panel.**

Step 2) Remove the Cart hardware. Remove the two screws holding the circuit board to the back of the plastic Cart socket. Remove the two long screws holding on circuit board to the rear of the cart socket and keep these to one side as they will be used to mount the LCD. Remove the two screws on the front of the plastic Cart unit (marked with yellow arrows) and remove the cart plastic and board assemblies from the MKS-30.

Step 3) Remove the Midi light board. This is held on by a single screw. Unsolder the red and green wires from this board marked 'A' and 'K'.

Step 4) Desolder and remove one of the two wire looms from the Cart board. These are both the same and either one will do. Solder this into the Kiwi-30 Display board taking note of the orientation. The wire in the number 1 position (this is black in our unit) must be fitted as is shown in the photo. If this is put in backward it will damage the display unit. Make sure that the pins of the plug do not touch the metal case of the display unit.





Step 5) The wires going to the front panel need to be moved to make room for the display board. To do this unscrew the two PG200 socket screws so the PG200 socket can be move out from the synth a few centimeters. The wires going to the plugs CN6, CN7 & CN8 need to be moved and put through the PG-200 hole as shown in the photo. These can then be plugged back into CN6, CN7 & CN8 and replace the PG-200 socket using the same screws.

Step 6) Solder the Green and Red LED wires that were removed from the small LED board into the holes marked Red & Grn. These can be fitted on the rear. We have found that some MKS-30s have these wires swapped. If the LED does not work with midi in then try swapping the Red & Green wires.

Step 7) Fit the display board into the MKS-30 using the two long screws that were holding on the board to the cart assembly.

Step 8) Remount the front panel making sure that the green midi LED fits into the hole in the front panel. This may need to be bent a little off center as the midi hole does not perfectly line up with the display board. Fit the top and bottom screws and refit the knobs.

Step 9) Plug the cable from the new display board into CN5.

3) Fitting the Midi Send

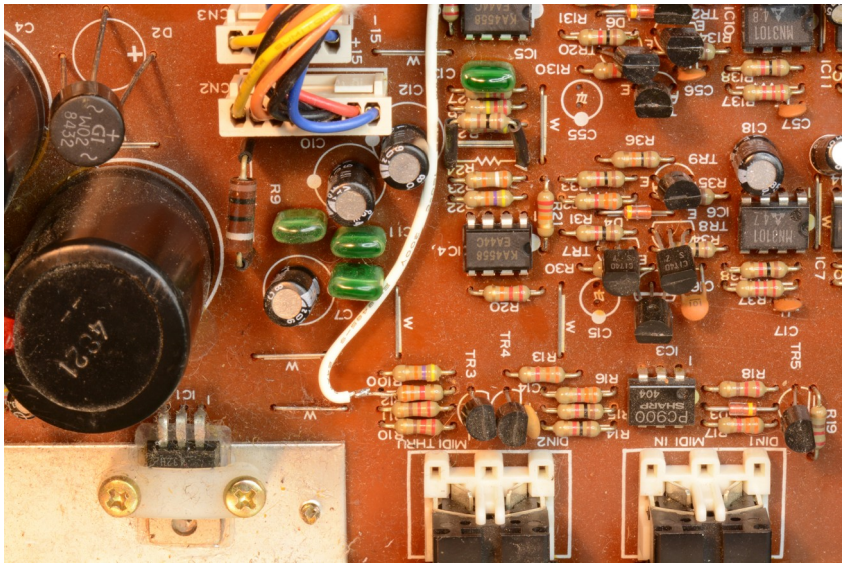
The long wire that was soldered to the main board CN9 pin 6 needs to be soldered to the end of R12 on the Jack Board at the rear of the MKS-30.
It is possible to lift the end of this resistor without removing the Jack board. If you need to remove the Jack board use the screw location photo and remove the purple screws and the plastic locking tabs marked in blue and the two nuts on the output sockets. The end of R12 shown in the photo needs to be lifted away from the board. It is possible heat this end of the resistor with a soldering iron and then lift the wire out of the board with pliers. This saves removing the jack board.

Once this is done solder the midi wire to this resistor as shown in the photo.

4) Tuning the MKS-30

Once the install is finished the MKS-30 should be tuned. Leave turned on for 30 mins to let the electronics stabilise and then follow the instructions for TEST MODE on Page 36.

The last step is to replace the top cover and rack mounts if fitted.



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 1-512. Each CC32 number (0 - 3) 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	---	
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-$7f (0-127)	
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 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-$7f (0-127)	
DCO1 ENV	$0a (10)	$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-$7f (0-127)	
DCO2 ENV	$11 (17)	$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-$7f (0-127)	
Mix DYN	$18 (24)	$00-$7f (0-127)	
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-$7f (0-127)	
VCF ENV	$1e (30)	$00-$7f (0-127)	
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 HPF	$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)	
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)	

Continuous Controllers

Continuous Controllers	Second	Third	Notes
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 or Kiwi-30 Edit 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
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 (0-31) 16' $20-$3f (32-63) 8' $40-$4f (64-127) 4'
DCO1 Wave	$42 (66)	$yy	yy = $00-$1f (0-31) Saw $20-$3f (32-63) Pulse $40-$7f (64-127) Square
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-$0f (0-15) ENV 1 Normal $10-$1f (16-31) ENV 1 Inverted $20-$2f (32-47) ENV 2 Normal $30-$3f (48-63) ENV 2 Inverted $40-$4f (64-79) ENV 3 Normal $50-$7f (80-127) ENV 3 Inverted
DCO2 Range	$46 (70)	$yy	yy = $00-$0f (0-31) 16' $20-$3f (32-63) 8' $40-$4f (64-127) 4'
DCO2 Wave	$47 (71)	$yy	yy = $00-$1f (0-31) Saw $20-$3f (32-63) Pulse $40-$5f (64-95) Square $60-$7f (96-127) 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-$0f (0-15) ENV 1 Normal $10-$1f (16-31) ENV 1 Inverted $20-$2f (32-47) ENV 2 Normal $30-$3f (48-63) ENV 2 Inverted $40-$4f (64-79) ENV 3 Normal $50-$7f (80-127) ENV 3 Inverted
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

Continuous Controllers

Continuous Controllers	Second	Third	Notes
VCF ENV Source	$4c (76)	$yy	yy = $00-$0f (0-15) ENV 1 Normal $10-$1f (16-31) ENV 1 Inverted $20-$2f (32-47) ENV 2 Normal $30-$3f (48-63) ENV 2 Inverted $40-$4f (64-79) ENV 3 Normal $50-$7f (80-127) ENV 3 Inverted
VCA Mode	$4d (77)	$yy	yy = $00-$1f (0-31) Gate $20-$3f (32-63) ENV 1 Normal $40-$5f (64-95) ENV 2 Normal $60-$7f (96-127) ENV 3 Normal
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 (64-79) 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 (64-79) 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 (64-79) 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
XMod	$54 (84)	$yy	yy = $00-$1f (0-31) Off $20-$3f (32-63) Sync1 $40-$5f (64-95) Sync2 $60-$7f (96-127) Metal
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 (64-95) 3 Octaves $60-$7f (96-127) 4 Octaves

Continuous Controllers

Continuous Controllers	Second	Third	Notes
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-$09 (0-9) Off $0a-$13 (10-19) DCO1 $14-$1d (20-29) DCO2 $1e-$27 (30-39) VCF $28-$31 (40-49) VCA $32-$3b (50-59) DCO1 + DCO2 $3c-$45 (60-69) DCO1 + VCF $46-$4f (70-79) DCO1 + VCA $50-$59 (80-89) DCO2 + VCF $5a-$63 (90-99) DCO2 + VCA $64-$6d (100-109) VCF + VCA $6e-$77 (110-119) DCO1 + VCF + VCA $78-$7f (120-127) DCO1 + DCO2 + VCF + VCA
AT Destination	$5d (93)	$yy	yy = $00-$09 (0-9) Off $0a-$13 (10-19) DCO1 $14-$1d (20-29) DCO2 $1e-$27 (30-39) VCF $28-$31 (40-49) VCA $32-$3b (50-59) DCO1 + DCO2 $3c-$45 (60-69) DCO1 + VCF $46-$4f (70-79) DCO1 + VCA $50-$59 (80-89) DCO2 + VCF $5a-$63 (90-99) DCO2 + VCA $64-$6d (100-109) VCF + VCA $6e-$77 (110-119) DCO1 + VCF + VCA $78-$7f (120-127) DCO1 + DCO2 + VCF + VCA
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

Continuous Controllers

Continuous Controllers	Second	Third	Notes
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-$0f (0-15) ENV 1 Normal $10-$1f (16-31) ENV 1 Inverted $20-$2f (32-47) ENV 2 Normal $30-$3f (48-63) ENV 2 Inverted $40-$4f (64-79) ENV 3 Normal $50-$7f (80-127) ENV 3 Inverted
Chorus Control	$6a (106)	$yy	yy = $00-$3f (0-63) Off $40-$7f (64-127) On
Matrix 0 Level	$6c (108)	$00-$7f (0-127)	
Matrix 1 Level	$6d (109)	$00-$7f (0-127)	
Matrix 2 Level	$6e (110)	$00-$7f (0-127)	
Matrix 3 Level	$6f (111)	$00-$7f (0-127)	
Matrix 4 Level	$70 (112)	$00-$7f (0-127)	
Matrix 5 Level	$71 (113)	$00-$7f (0-127)	
Matrix 6 Level	$72 (114)	$00-$7f (0-127)	
Matrix 7 Level	$73 (115)	$00-$7f (0-127)	
Matrix 8 Level	$74 (116)	$00-$7f (0-127)	
Matrix 9 Level	$75 (117)	$00-$7f (0-127)	
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	
	$07	Product Family ID (Kiwi-30)	
	$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
	$07	Kiwitechnics Kiwi-30 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-30 becomes unusable due to non valid data you may need to do a full restore of the Kiwi-30 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-30 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-30 will not be passed Note – Active Sensing commands are suppressed within the Kiwi-30 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 = 5-299 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) Note – This is added to FP control as the range of this is quite small. Both controls centered should be A440. If it is off the internal master oscillators in the MKS-30 will need to be adjusted.

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$0c (12) = Front Panel Clock display	0000000x	x = Off/On (set=On)
	$0d (13) = Guitar Mode	0000000x	x = Off/On (set=On) – Note this uses midi channels 1-6 only
	$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	0000yyxx	xx = DCO 1 Range 00=16' 01=8' 10=4' yy = DCO 1 Wave 00=Saw 01=Pulse 10=Sqr
	$11 (17)=DCO1 Coarse Tune	0xxxxxxx	x=0-48 (-12 → +12 notes in half semitone steps)
	$12 (18)=DCO1 LFO Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$13 (19)=DCO1 ENV Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$14 (20)=DCO1 DYN Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$15 (21)=DCO1 Control	000xyyzz	zz = DCO1Env(00=Env1,01=Env2,10=Env3) yy = DCO1LFO(00=LFO1,01=LFO2,10=LFO3) x = DCO1Env Pol(0=Norm,1=Inverted)
	$16 (22)=DCO2 Wave/Range	0000yyxx	xx = DCO 2 Range 00=16' 01=8' 10=4' yy = DCO 2 Wave 00=Saw 01=Pulse 10=Sqr 11=Noise
	$17 (23)=DCO2 Coarse Tune	0xxxxxxx	x=0-48 (-12 → +12 notes in half semitone steps)

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$18 (24)=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
	$19 (25)=DCO2 LFO Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$1a (26)=DCO2 ENV Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$1b (27)=DCO2 DYN Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$1c (28) DCO Xmod	000000xx	xx = 00=Off 01=Sync1 10=Sync2 11=XMod
	$1d (29)=DCO2 Control	000xyyzz	zz = DCO1Env(00=Env1,01=Env2,10=Env3) yy = DCO1LFO(00=LFO1,01=LFO2,10=LFO3) x = DCO1Env Pol(0=Norm,1=Inverted)
	$1e (30)=Voice Detune Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$1f (31)=DCO1/2 Mix	0xxxxxxx	x = Range $00-$7f (0-127)
	$20 (32)=MIX DYN Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$21 (33)=MIX Env Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$22 (34)=Mix Control	000x00zz	zz = MixEnv(00=Env1,01=Env2,10=Env3) x = MixEnv Pol(0=Norm,1=Inverted)
	$23 (35)=VCF Cutoff Hi	000xxxxx	
	$24 (36)=VCF Cutoff Lo	0yyyyyyy	Hi & Lo are combined to make single 12 bit command. 000xxxxx + 0yyyyyyy = 0000xxxx xyyyyyyy x = Range $0-$fff (0-4095)
	$25 (37)=VCF Resonance Hi	000xxxxx	
	$26 (38)=VCF Resonance Lo	0yyyyyyy	Hi & Lo are combined to make single 12 bit command. 000xxxxx + 0yyyyyyy = 0000xxxx xyyyyyyy x = Range $0-$fff (0-4095)
	$27 (39)=VCF LFO Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$28 (40)=VCF ENV Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$29 (41)=VCF KEY Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$2a (42)=VCF DYN Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$2b (43)=VCF Control	000xyyzz	zz = VCFEnv(00=Env1,01=Env2,10=Env3) yy = VCFLFO(00=LFO1,01=LFO2,10=LFO3) x = VCFEnv Pol(0=Norm,1=Inverted)
	$2c (44)=VCA Level	0xxxxxxx	x = Range $00-$7f (0-127)

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$2d (45)=VCA LFO Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$2e (46)=VCA Control	0000yyzz	zz = VCAENV(00=Gate,01=Env1,10=Env2,11=Env3) yy = VCALFO(00=LFO1,01=LFO2,10=LFO3)
	$2f (47)=VCA DYN Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$30 (48)=HPF Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$31 (49)=Matrix 0 Source	000xxxxx	x = 0-23 – See Table 1
	$32 (50)=Matrix 0 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$33 (51)=Matrix 0 Destination	000xxxxx	x = 0-26 – See Table 3
	$34 (52)=Matrix 1 Source	000xxxxx	x = 0-23 – See Table 1
	$35 (53)=Matrix 1 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$36 (54)=Matrix 1 Destination	000xxxxx	x = 0-26 – See Table 3
	$37 (55)=Matrix 2 Source	000xxxxx	x = 0-23 – See Table 1
	$38 (56)=Matrix 2 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$39 (57)=Matrix 2 Destination	000xxxxx	x = 0-26 – See Table 3
	$3a (58)=Matrix 3 Source	000xxxxx	x = 0-23 – See Table 1
	$3b (59)=Matrix 3 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$3c (60)=Matrix 3 Destination	000xxxxx	x = 0-26 – See Table 3
	$3d (61)=Matrix 4 Source	000xxxxx	x = 0-23 – See Table 1
	$3e (62)=Matrix 4 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$3f (63)=Matrix 4 Destination	000xxxxx	x = 0-26 – See Table 3
	$40 (64)=Matrix 5 Source	000xxxxx	x = 0-23 – See Table 1
	$41 (65)=Matrix 5 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$42 (66)=Matrix 5 Destination	000xxxxx	x = 0-26 – See Table 3
	$43 (67)=Matrix 6 Source	000xxxxx	x = 0-23 – See Table 1
	$44 (68)=Matrix 6 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$45 (69)=Matrix 6 Destination	000xxxxx	x = 0-26 – See Table 3
	$46 (70)=Matrix 7 Source	000xxxxx	x = 0-23 – See Table 1
	$47 (71)=Matrix 7 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$48 (72)=Matrix 7 Destination	000xxxxx	x = 0-26 – See Table 3
	$49 (73)=Matrix 8 Source	000xxxxx	x = 0-23 – See Table 1

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$4a (74)=Matrix 8 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$4b (75)=Matrix 8 Destination	000xxxxx	x = 0-26 – See Table 3
	$4c (76)=Matrix 9 Source	000xxxxx	x = 0-23 – See Table 1
	$4d (77)=Matrix 9 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$4e (78)=Matrix 9 Destination	000xxxxx	x = 0-26 – See Table 3
	$4f (79)=ENV1 Attack	0xxxxxxx	x = Range $00-$7f (0-127)
	$50 (80)=ENV1 Decay	0xxxxxxx	x = Range $00-$7f (0-127)
	$51 (81)=ENV1 Sustain	0xxxxxxx	x = Range $00-$7f (0-127)
	$52 (82)=ENV1 Release	0xxxxxxx	x = Range $00-$7f (0-127)
	$53 (83)=ENV2 Attack	0xxxxxxx	x = Range $00-$7f (0-127)
	$54 (84)=ENV2 Decay	0xxxxxxx	x = Range $00-$7f (0-127)
	$55 (85)=ENV2 Sustain	0xxxxxxx	x = Range $00-$7f (0-127)
	$56 (86)=ENV2 Release	0xxxxxxx	x = Range $00-$7f (0-127)
	$57 (87)=ENV3 Attack	0xxxxxxx	x = Range $00-$7f (0-127)
	$58 (88)=ENV3 Decay	0xxxxxxx	x = Range $00-$7f (0-127)
	$59 (89)=ENV3 Sustain	0xxxxxxx	x = Range $00-$7f (0-127)
	$5a (90)=ENV3 Release	0xxxxxxx	x = Range $00-$7f (0-127)
	$5b (91)=LFO 1 Wave	000000xxx	xxx = 000=Sine 001=Triangle 010=Square 011=Saw 100=Reverse Saw 101=Random 110=Fast Random
	$5c (92)=LFO 1 Rate	0xxxxxxx	x = Range $00-$7f (0-127)
	$5d (93)=LFO 1 Delay	0xxxxxxx	x = Range $00-$7f (0-127)

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$5e (94)=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
	$5f (95)=LFO 2 Wave	000000xxx	xxx = 000=Sine 001=Triangle 010=Square 011=Saw 100=Reverse Saw 101=Random 110=Fast Random
	$60 (96)=LFO 2 Rate	0xxxxxxx	x = Range $00-$7f (0-127)
	$61 (97)=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
	$62 (98)=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
	$63 (99)=LFO 3 Wave	000000xxx	xxx = 000=Sine 001=Triangle 010=Square 011=Saw 100=Reverse Saw 101=Random 110=Fast Random
	$64 (100)=LFO 3 Rate	0xxxxxxx	x = Range $00-$7f (0-127)
	$65 (101)=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
	$66 (102)=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
	$67 (103)=Portamento Rate	0xxxxxxx	x = Range $00-$7f (0-127)
	$68 (104)=Load Sequence	000xxxxx	Seq number to load (1-8) - 0 is do not load Seq
	$69 (105)=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=Unison 100=Solo w = 0 = Staccato – Envs restarted for each note 1 = Legato - Envs restarted only if all notes off
	$6a (106)=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)
	$6b (107)=Arp Control	00yyy0zz	zz = 00=1Oct,01=2Oct,10=3Oct yyy = 000=Up,001=Dn,010=U/D,011=Rndm,100=As Played
	$6c (108)=AT Control	0000wxyz	z = DCO1 LFO (1=on) y = DCO2 LFO (1=on) x = VCF Cutoff (1=on) w = VCA Level (1=on)
	$6d (109)=MW 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
	$6e (110)=Midi Control	0000w0yz	z = Arp Enable (1=Enabled) y = Sequence Enable (1=Enabled) w = Hold Enabled (1=Hold On)
	$6f (111)=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. 0-255 = 5-300 BPM This byte is sent as two nibbles which are combined to make single 8 bit command. 0000xxxx + 0000yyyy = xxxxyyyy
	$70 (112)=Patch Clock TempoLo	0000yyyy	
	$71 (113)=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)
	$72 (114)=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)
	$73 (115) Not Used	Not Used	
	$74 (116) Not Used	Not Used	
	$75 (117) Analog Feel Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$76 (118) Bend Range	0xxxxxxx	x = Range $00-$7f (0-127) (127=±1 Octave)
	$77 (119) Chorus Control	0000000z	z = 0 = Off, 1=On
	$78-$7f (120-127)		Not Used

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
$05 (5) Request Tone Dump Voice # + Bank + Tone	$01 (1) - Bank Number	000000xx	xx = 0 for Tones 1-128 1 for Tones 129-256
WARNING! This command will overwrite the current sounding Tone with the Tone selected	$02 (2) - Tone Number	0xxxxxxx	x = 0-127 Kiwi-30 transmits a $06 (6) command
$06 (6) Transmit/Receive Tone Dump Voice # + Bank + Tone + 256 data bytes	$01 (1) - Bank Number	000000xx	xx = 0 for Tones 1-128 1 for Tones 129-256
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-30 transmits data in the same format as the $04 Command
$09 (9) Request Seq Dump Voice Number + Seq Number	$01 (1) - Sequence Number	000xxxxx	x = 0-7 Kiwi-30 transmits a $0a (10) command with 1659 data bytes
WARNING! This command will overwrite the current sounding Seq with the Seq selected			
$0a (10)Transmit / Receive Seq Dump Voice Number + Seq Number + 1659 data bytes	$01 (1) - Sequence Number	000xxxxx	x = 0-7 Kiwi-30 transmits a $0a (10) command with 1659 data bytes
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

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$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 Voice Number + 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. $1f=DCO12Mix Kiwi-30 transmits a $0e (14) command
$0e (14) Transmit / Receive Edit Buffer Tone Parameter Voice # + 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. $1f=DCO12Mix Kiwi-30 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
$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

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$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

0	Off
1	Bend Up
2	Bend Down
3	Bend Full
4	Midi Mod
5	Key Down Velocity[1]
6	Key Note[1]
7	LFO1 (bipolar)
8	LFO1 (unipolar)
9	LFO2 (bipolar)
10	LFO2 (unipolar)
11	LFO3 (bipolar)
12	LFO3 (unipolar)
13	ENV1[1]
14	ENV2[1]
15	ENV3[1]
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[1]

Matrix Destination Types

0	Off
1	DCO1 Freq[2]
2	DCO2 Freq[2]
3	All DCO Freq[2]
4	DCO1 Wave[3]
5	DCO1 Range[3]
6	DCO2 Wave[3]
7	DCO2 Range[3]
8	DCO Mix Level[3]
9	DCO Detune[3]
10	VCF High Pass[3]
11	VCF Cutoff[2]
12	VCF Resonance[3]
13	VCA Level[2]
14	Portamento Rate[3]
15	LFO1 Rate[3]
16	LFO2 Rate[3]
17	LFO3 Rate[3]
18	ENV1 Attack Rate[3]
19	ENV1 Decay Rate[3]
20	ENV1 Release Rate[3]
21	ENV2 Attack Rate[3]
22	ENV2 Decay Rate[3]
23	ENV2 Release Rate[3]
24	ENV3 Attack Rate[3]
25	ENV3 Decay Rate[3]
26	ENV3 Release Rate[3]

[1] = Source is per voice
[2] = Destination is per voice
[3] = Destination is used in all voices