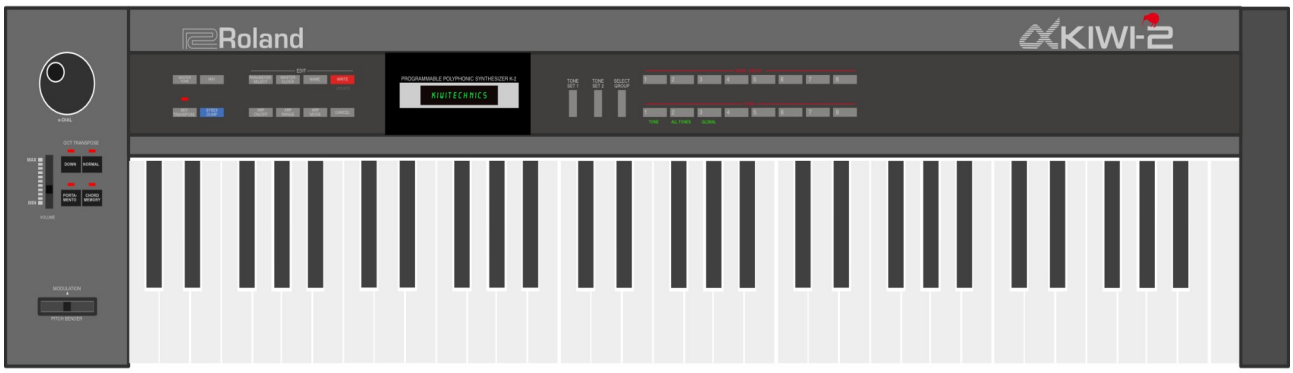
Roland

KIWI-2

KIWITECHNICS UPGRADE



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Kiwi-2 Features

- 1024 Tones in 2 sets of 512 can be stored and edited. It is also possible to temporarily edit any Tone.
- Square, Saw & Sub Waves available and these can be mixed. Pulse Width & Pulse Width Modulation available on Saw & Square waves.
- Tones can be edited using the front panel or midi.
- 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 Kiwi-2 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 an '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 the Roland ADSR style. 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 (Juno-2 only).
- Full Matrix mod system that can channel any mod source to any mod destination.
- Channel Aftertouch (Juno-2 or midi), Polyphonic Aftertouch (midi only)
- 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 (Juno-2 only)

ARPEGGIATOR

- The Arpeggiator is clocked from the Master Clock and can be 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 front panel buttons (Juno-2 Only) or Midi Commands
- Appeggiator will Output Midi Data

Kiwi 2 Juno-2 Flow Chart

KIWI-2

v100 Menu Structure

POWER ON
ALL EXITS COME TO HERE

NORMAL PATCH PLAY / ARPEGGIATOR

SELECT SET
- SELECT SET Button — Toggle between SETS 1&2; Loads Tone -> Working Buffer

SELECT GROUP
- SELECT GROUP Button — $02
- Select GROUP using BANK Buttons 1-8 — Loads Tone -> Working Buffer

LOAD TONE
- Bank/Num Buttons — Load Tone -> Working Buffer; Select Bank (1-8) using Bank Buttons; Select Patch (1-8) using Number Buttons

SAVE TONE
- WRITE Button Pressed — $04
- WRITE Pushed — Abort

SELECT SET
- SELECT SET Button — Toggle between SETS 1&2

SELECT GROUP
- SELECT GROUP Button — $06
- Select GROUP using BANK Buttons 1-8

SELECT BANK
- Bank Buttons — Select Bank (1-8) using Bank Buttons

SAVE TONE
- TONE Button Pressed — Save Tone to current S/G/B selections

EDIT PATCH NAME
- NAME Button Pressed — $08
- Select Character Using PARAMETER & VALUE Buttons
- Edit value using ALPHA Dial
- NAME Button Pressed

SET CHORD
- 'CHORD' Button Pressed — $0F
- 'CHORD' Button Released — If key(s) pressed Set Chord; If no key pressed Clear Chord; Whole Button Light will be on when a Chord is set

ARP ON/OFF
- MOD RATE Button (ARP START/STOP) — Toggles Arp Play Mode

ARP MODE
- MOD DEPTH Button (ARP MODE) — $09; Select Arp mode option using ALPHA Dial; Press again to Exit

ARP RANGE
- BRILLIANCE Button (ARP RANGE) — $0A; Select Arp Range option using ALPHA Dial; Press again to Exit

KEY TRANSPOSE

- PRESS KEY TRANSPOSE — $E1
- PRESS NOTE TO SET TRANSPOSE
- PRESS KEY TRANSPOSE

SYSEX DUMP

- SYSEX Button — $30
  - Button 1 — Send Patch Edit Buffer — $30
  - Button 2 — Send Current Bank(64) — WARNING - Large File size — $31
  - Button 3 — Send Global Params — $32
- ABORT
  - SYSEX Button or CANCEL
  - Write — Send Current Dump to Midi

INTERNAL MASTER CLOCK SPEED

- Press MASTER CLOCK — $E3
- Set with ALPHA DIAL
- Press MASTER CLOCK

MIDI PARAMETER EDIT

- MIDI BUTTON — Midi Paramaters — $40
- ABORT
  - MIDI or CANCEL — Go to Normal Play Mode
- MIDI BUTTON PRESSES
  - In Channel — $40
  - Out Channel — $41
  - Soft Through — $42
  - Program Change Enable — $43
  - MIDI CC Enable — $44
- ALTER USING ALPHA DIAL
- Display
  - '01-16' = Channel; 'AL' = Omni
  - '01-16' = Channel
  - '01' = Stop All* (SA); '02' = Pass All (PA); '03' = Pass Only NonCC (PN); '04' = Stop used CC (SU)
  - 'OFF' = Off; 'IN' = In Only; 'OUT' = Out Only; 'BTH' = Both In & Out*

* =Default Setting

MASTER FINE TUNE

- PRESS TUNE — $E5
- EDIT M.TUNE USING ALPHA DIAL
- PRESS TUNE

PATCH/GLOBAL PARAMETER EDIT

MIDI PANIC
- ENV TIME (CANCEL) Pushed
- Stop All Sounding Voices

- PARAMETER PRESS — $60
  - SELECT PARAM USING GROUP BUTTON & ALPHA DIAL 1-4 or BANK BUTTON 1-4 TONE BUTTON 1-8
  - EDIT VALUE USING ALPHA DIAL
- EXIT EDIT MODE
- PARAMETER PRESS

DCO & VCA

1	1	1	Range	DCO
		2	Saw Wave	
		3	Pulse Wave	
		4	Sub Wave	
		5	Sub Level	
		6	Tune	
		7	LFO Amount	
		8	LFO Select	
	2	1	Env Amount	
		2	Env Select	
		3	PW Amount	
		4	PWM Amount	
		5	PWM Select	
		6	Frequency Dynamics	
		7	Noise Level	
		8		
	3	1	Detune	
		2	Analog Feel	
		3	Bend Range	
		4	Patch Clk	
		5	Mode	VOICE
		6	Steal Mode	
		7	Stacatto / Legato	
		8	Portamento	
	4	1		
		2	Output Level	VCA
		3	LFO Level	
		4	LFO Select	
		5	Env Select	
		6	Dynamics	

VCF & ENV

2	1	1	HPF Frequency	VCF
		2	Cutoff Frequency	
		3	Resonance	
		4	LFO Amount	
		5	LFO Select	
		6	Env Amount	
		7	Env Select	
		8	Keytracking	
	2	1	Frequency Dynamics	
		2	Wave	LFO 1
		3	Rate	
		4	Delay	
		5	Mode	
		6	Sync	
		7	Wave	LFO 2
		8	Rate	
	3	1	Delay	
		2	Mode	
		3	Sync	
		4	Wave	LFO 3
		5	Rate	
		6	Delay	
		7	Mode	
		8	Sync	
	4	1		
		2		
		3		
		4		
		5		
		6		

MATRIX

3	1	1	Source	MOD 0
		2	Level	
		3	Destination	
		4	Source	MOD 1
		5	Level	
		6	Destination	
		7	Source	MOD 2
		8	Level	
	2	1	Destination	
		2	Source	MOD 3
		3	Level	
		4	Destination	
		5	Source	MOD 4
		6	Level	
		7	Destination	
		8	Source	MOD 5
	3	1	Level	
		2	Destination	
		3	Source	MOD 6
		4	Level	
		5	Destination	
		6	Source	MOD 7
		7	Level	
		8	Destination	
	4	1	Source	MOD 8
		2	Level	
		3	Destination	
		4	Source	MOD 9
		5	Level	
		6	Destination	

LFO & GLOBAL

4	1	1	Attack	ENV 1
		2	Decay	
		3	Sustain	
		4	Release	
		5	Attack	ENV 2
		6	Decay	
		7	Sustain	
		8	Release	
	2	1	Attack	ENV 3
		2	Decay	
		3	Sustain	
		4	Release	
		5		
		6		
		7		
		8	Mode	CHORUS
	3	1	Rate	
		2	Arp Mode	ARP
		3	Arp Range	
		4	Arp Step Timing	
		5		
		6		
		7		
		8		GLOBAL
	4	1	Midi Clk Gen	
		2	Mst Clock Source	
		3	Int Clock Rate	
		4	Master Fine Tune	
		5	Guitar Mode	
		6	CART Import	

MODULATION MATRIX DETAILS

MATRIX SOURCES
0=Off
1=Bend Up
2=Bend Down
3=Bend Full
4=Midi or Mod Wheel
5=Key Down Velocity*
6=Key Up Velocity*
7=Key Note*
8=LFO1 (bipolar)
9=LFO1 (unipolar)
10=LFO2 (bipolar)
11=LFO2 (unipolar)
12=LFO3 (bipolar)
13=LFO3 (unipolar)
14=ENV1*
15=ENV2*
16=ENV3*
17=MidiCC#1 (CC47)
18=MidiCC#2 (CC48)
19=MidiCC#3 (CC49)
20=MidiCC#4 (CC50)
21=MidiCC#5 (CC51)
22=MidiCC#6 (CC52)
23=Midi Channel After Touch
24=Midi Note After Touch*
25=Keyboard Gate
26=Midi Hold
27=Alpha Dial

* Source is per voice

MATRIX DESTINATIONS
0=Off
1=DCO Freq*
2=DCO Saw Wave
3=DCO Pulse Wave
4=DCO Sub Wave
5=DCO Range
6=DCO LFO Level
7=DCO ENV Level
8=DCO PW Level
9=DCO PWM Level
10=DCO Detune
11=VCF High Pass
12=VCF LP Cutoff*
13=VCF LP Resonance
14=VCF LP LFO Level
15=VCF LP ENV Level
16=VCF LP Key Level
17=VCA Level*
18=VCA LFO Level
19=Portamento Rate
20=LFO1 Rate
21=LFO2 Rate
22=LFO3 Rate
23=ENV1 T1 Rate
24=ENV1 Level 1
25=ENV1 T2 Rate
26=ENV1 Level 2
27=ENV1 T3 Rate
28=ENV1 Level 3
29=ENV1 T4 Rate
30=ENV2 T1 Rate
31=ENV2 Level 1
32=ENV2 T2 Rate
33=ENV2 Level 2
34=ENV2 T3 Rate
35=ENV2 Level 3
36=ENV2 T4 Rate
37=ENV3 T1 Rate
38=ENV3 Level 1
39=ENV3 T2 Rate
40=ENV3 Level 2
41=ENV3 T3 Rate
42=ENV3 Level 3
43=ENV3 T4 Rate
44=Chorus Rate

* Destination is per voice

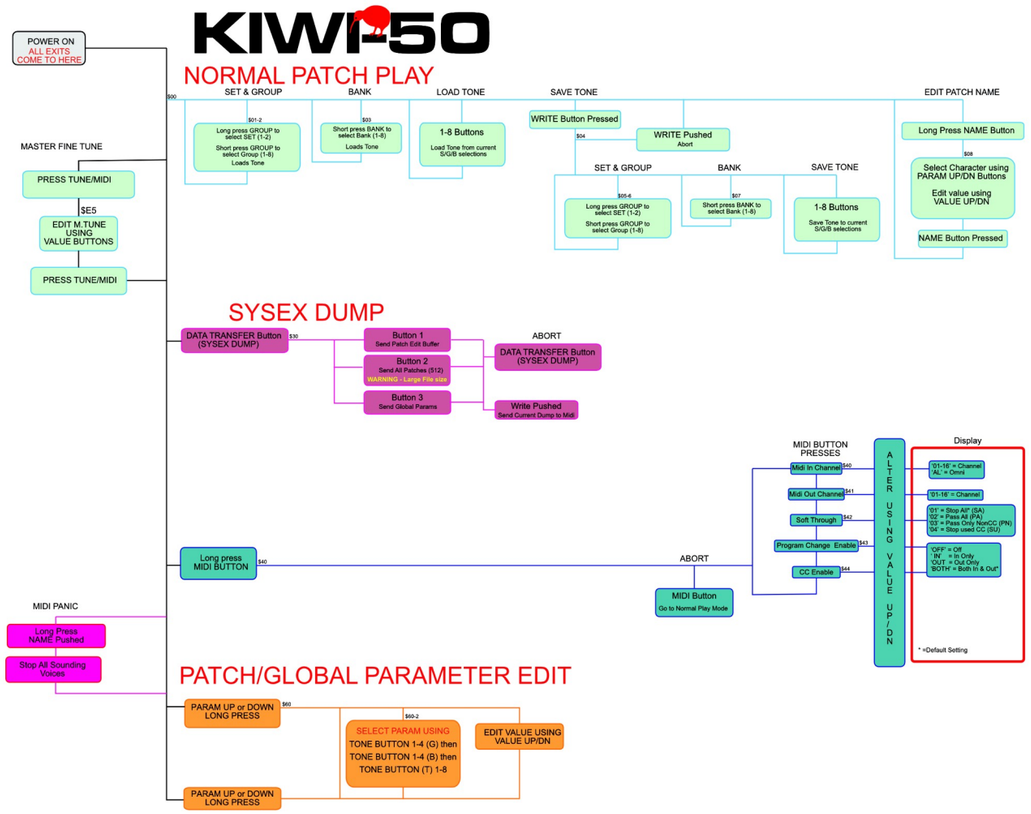
Power On Options

FULL FACTORY RESTORE	FIRMWARE UPDATE
WRITE & NAME Held — WARNING! WILL ERASE ALL MEMORY	WRITE Held — Play update into Midi In Port

KIWI TECHNICS

Note - All Buttons are Press and Release except where noted

Kiwi 2 MKS-50 Flow Chart



DCO & VCA

1	1	1	Range	DCO
		2	Saw Wave	
		3	Pulse Wave	
		4	Sub Wave	
		5	Sub Level	
		6	Tune	
		7	LFO Amount	
		8	LFO Select	
	2	1	Env Amount	
		2	Env Select	
		3	PW Amount	
		4	PWM Amount	
		5	PWM Select	
		6	Frequency Dynamics	
		7	Noise Level	
		8		
	3	1	Detune	
		2	Analog Feel	
		3	Bend Range	
		4	Patch Clk	
		5	Mode	VOICE
		6	Steal Mode	
		7	Stacatto / Legato	
		8	Portamento	
	4	1	Portamento On/Off	
		2	Output Level	VCA
		3	LFO Level	
		4	LFO Select	
		5	Env Select	
		6	Dynamics	

VCF & ENV

2	1	1	HPF Frequency	VCF
		2	Cutoff Frequency	
		3	Resonance	
		4	LFO Amount	
		5	LFO Select	
		6	Env Amount	
		7	Env Select	
		8	Keytracking	
	2	1	Frequency Dynamics	
		2	Time 1	ENV 1
		3	Level 1	
		4	Time 2	
		5	Level 2	
		6	Time 3	
		7	Level 3	
		8	Time 4	
	3	1	Time 1	ENV 2
		2	Level 1	
		3	Time 2	
		4	Level 2	
		5	Time 3	
		6	Level 3	
		7	Time 4	
		8	Time 1	ENV 3
	4	1	Level 1	
		2	Time 2	
		3	Level 2	
		4	Time 3	
		5	Level 3	
		6	Time 4	

MATRIX

3	1	1	Source	MOD 0
		2	Level	
		3	Destination	
		4	Source	MOD 1
		5	Level	
		6	Destination	
		7	Source	MOD 2
		8	Level	
	2	1	Destination	
		2	Source	MOD 3
		3	Level	
		4	Destination	
		5	Source	MOD 4
		6	Level	
		7	Destination	
		8	Source	MOD 5
	3	1	Level	
		2	Destination	
		3	Source	MOD 6
		4	Level	
		5	Destination	
		6	Source	MOD 7
		7	Level	
		8	Destination	
	4	1	Source	MOD 8
		2	Level	
		3	Destination	
		4	Source	MOD 9
		5	Level	
		6	Destination	

LFO & GLOBAL

4	1	1	Wave	LFO 1
		2	Rate	
		3	Delay	
		4	Mode	
		5	Sync	
		6	Wave	LFO 2
		7	Rate	
		8	Delay	
	2	1	Mode	
		2	Sync	
		3	Wave	LFO 3
		4	Rate	
		5	Delay	
		6	Mode	
		7	Sync	
		8	Mode	CHORUS
	3	1	Rate	
		2	Mode	ARP
		3	Range	
		4	Arp Step Timing	
		5		GLOBAL
		6	Midi Clk Gen	
		7	Mst Clock Source	
		8	Int Clock Rate	
	4	1	Master Fine Tune	
		2	Guitar Mode	
		3		
		4		
		5		
		6		

v100 Menu Structure

MODULATION MATRIX DETAILS

MATRIX SOURCES
0=Off
1=Bend Up
2=Bend Down
3=Bend Full
4=Midi or Mod Wheel
5=Key Down Velocity*
6=Key Up Velocity*
7=Key Note*
8=LFO1 (bipolar)
9=LFO1 (unipolar)
10=LFO2 (bipolar)
11=LFO2 (unipolar)
12=LFO3 (bipolar)
13=LFO3 (unipolar)
14=ENV1*
15=ENV2*
16=ENV3*
17=MidiCC#1 (CC47)
18=MidiCC#2 (CC48)
19=MidiCC#3 (CC49)
20=MidiCC#4 (CC50)
21=MidiCC#5 (CC51)
22=MidiCC#6 (CC52)
23=Midi Channel After Touch
24=Midi Note After Touch*
25=Keyboard Gate
26=Midi Hold

* Source is per voice

MATRIX DESTINATIONS
0=Off
1=DCO Freq*
2=DCO Saw Wave
3=DCO Pulse Wave
4=DCO Sub Wave
5=DCO Range
6=DCO LFO Level
7=DCO ENV Level
8=DCO PW Level
9=DCO PWM Level
10=DCO Detune
11=VCF High Pass
12=VCF LP Cutoff*
13=VCF LP Resonance
14=VCF LP LFO Level
15=VCF LP ENV Level
16=VCF LP Key Level
17=VCA Level*
18=VCA LFO Level
19=Portamento Rate
20=LFO1 Rate
21=LFO2 Rate
22=LFO3 Rate
23=ENV1 T1 Rate
24=ENV1 T2 Rate
25=ENV1 T3 Rate
26=ENV1 T4 Rate
27=ENV2 T1 Rate
28=ENV2 T2 Rate
29=ENV2 T3 Rate
30=ENV2 T4 Rate
31=ENV3 T1 Rate
32=ENV3 T2 Rate
33=ENV3 T3 Rate
34=ENV3 T4 Rate
35=Chorus Rate

* Destination is per voice

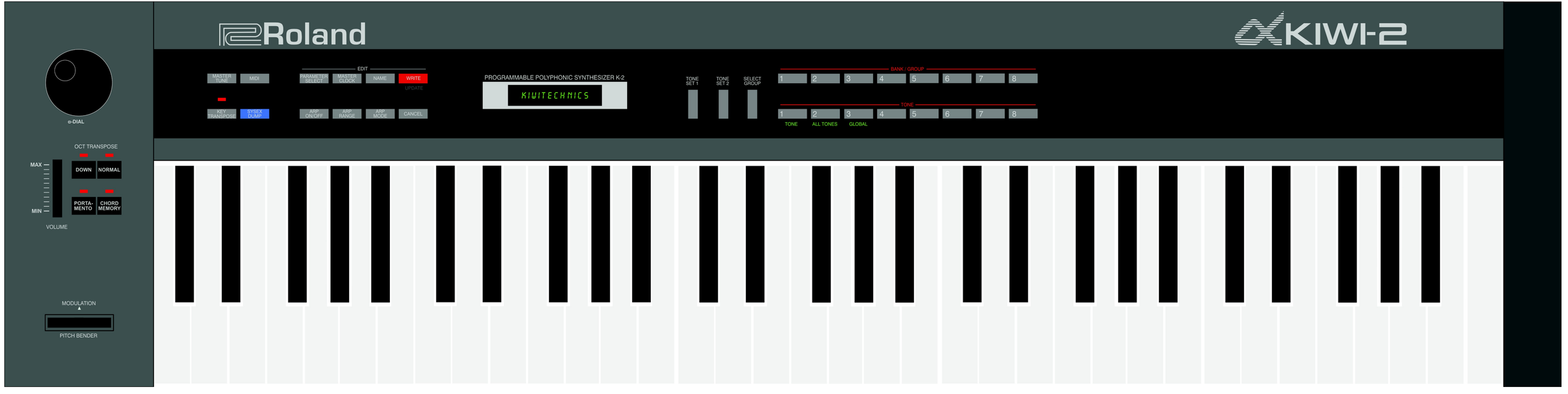
Power On Options

FULL FACTORY RESTORE	FIRMWARE UPDATE
WRITE & TONE Held WARNING! WILL ERASE ALL MEMORY	WRITE Held Play update into Midi In Port

Kiwi TECHNICS

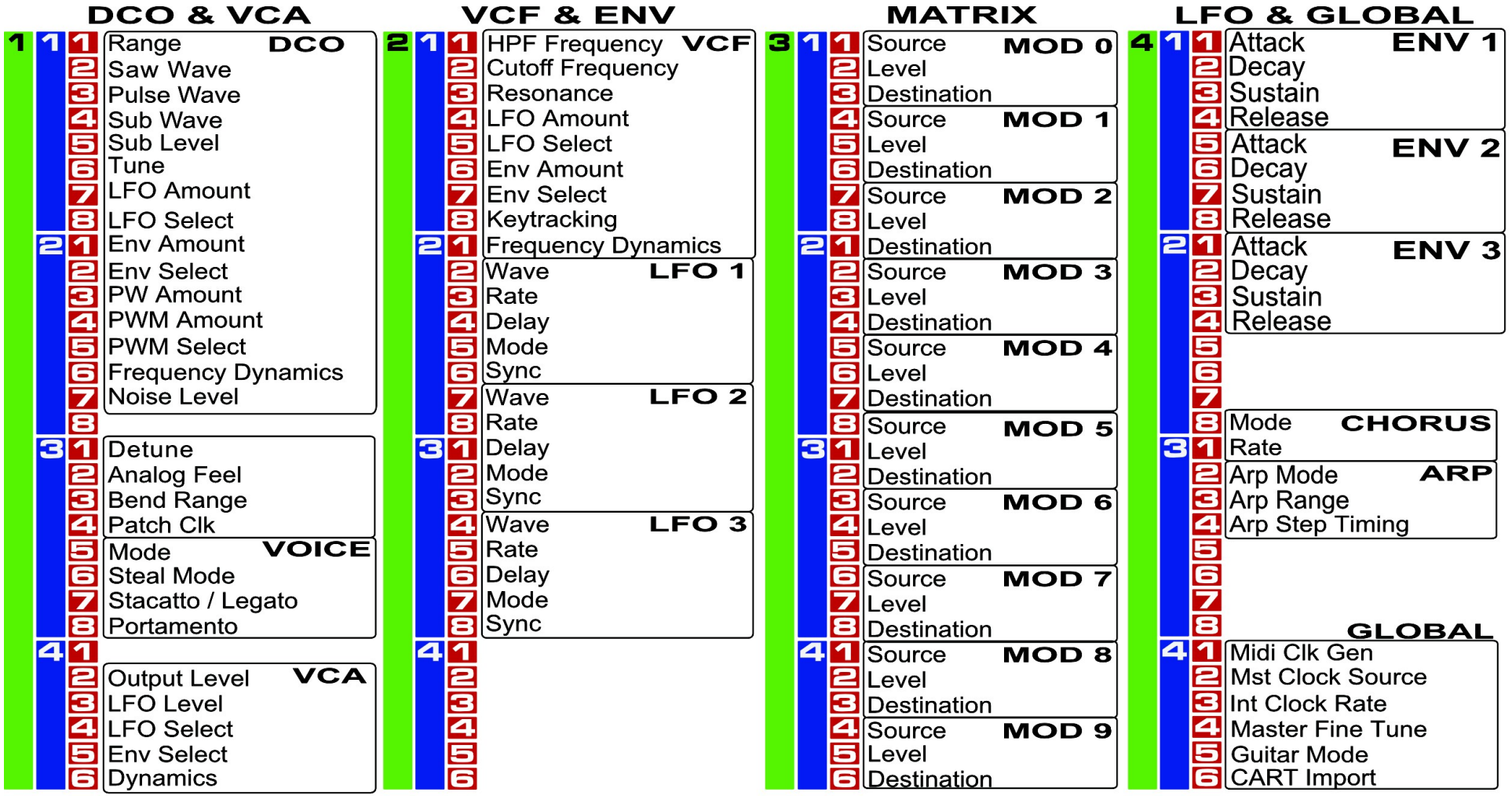
Note - All Buttons are Press and Release except where noted

Kiwi 2 Front Panel (Juno2)



Kiwi 2 Front Panel (MKS-50)

Kiwi 2 Parameter Edit Map



Front Panel Description

The Kiwi-2 front panel differs from the original Juno 2 or MKS-50 and the Kiwi-2 Upgrade redefines many of the buttons on the Synth. 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 tones in the Kiwi-2 each tone has a four number addressing system that looks like 1:4:8:3. These refer to the Set (1-2), Group (1-8), Bank (1-8) & Tone (1-8) numbers.

The way these are selected depends on the variation of the Kiwi-2.

For the Juno2 the Set is selected using the SET 1 (labeled PRESET) and SET 2 (labeled MEMORY) buttons. The Group is set by pressing the GROUP (labeled CARTRIDGE) button followed by the Group number using the top row BANK buttons. The Bank and Tone numbers are set using the buttons Bank (labeled BANK) and Tone (labeled NUMBER).

For the MKS-50 the Tone selection is done as follows. To select the SET long press the GROUP button (labeled PATCH A<>B) and select the Set 1 or 2 using the number buttons. To select the GROUP press and release the GROUP button (labeled PATCH A<>B) and then select the Group 1-8 using the number buttons. To select the BANK press and release the BANK button (labeled TONE a<>b) and then select the Bank 1-8 using the number buttons. To select a Tone in the current SET/GROUP/BANK press the number buttons 1-8 without pressing any other buttons first. Alternately the VALUE up/down button can be used to step up or down tone numbers.

The total number of tones available in both variations are 2 sets x 8 groups x 8 banks x 8 tones (2x8x8x8=1024)

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

KIWI-2 BUTTONS		
DOWN/NORMAL	Juno 2 Only	Sets Synth output to 1 octave down or normal. This setting is not remembered at power off.
PORTAMENTO	Juno 2 Only	Enables or Disables Portamento. The Portamento Rate is set using the parameter. This setting must be saved with the Tone or it will be lost on a tone change or power off.
CHORD	Juno 2 Only	This button is used to set or clear a Chord. Pressing and releasing this button while playing the chord will set a chord. Pressing and releasing this button with no notes playing will clear a chord. This setting is not remembered at power off.
TUNE/FUNCTION	Juno 2 Only	Press TUNE to enter Tune Mode. Use the Alpha Dial to set the master tune and press TUNE again to exit tune mode.
TUNE/MIDI	MKS50 Only	A short press sets the master tune. Use the VALUE up/down to set the tune and press again to exit this mode. A Long Press (1+ seconds) sets midi functions edit Mode. Once in this mode each press of the TUNE/MIDI button will take you to the next Midi function. Use the VALUE up/down to change values. Once all Midi parameters have been cycled the synth will return to normal play mode.
MIDI	Juno 2 Only	Each press of the MIDI button will take you to the next Midi function. Use the ALPHA DIAL to change values. Once all Midi parameters have been cycled the synth will return to normal play mode.
KEY TRANSPOSE	Juno 2 Only	To set a key transpose press the KEY TRANSPOSE button and while it is being pressed select the transpose key by pressing and releasing the note using the keyboard then release the Key Transpose button. If any transpose key other than middle C is selected the Transpose Button light will be on.

KIWI-2 BUTTONS		
DATA TRANSFER	Juno-2 & MKS-50 Midi Dumps **NOTE - Any temporary edits will be lost. You should save any edited tones before starting any dumps.**	Three different dumps are available. 1) CURRENT TONE. Button '1' followed by the 'WRITE' button will dump the current TONE. 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) GLOBAL PARAMETERS. Button '3' followed by the 'WRITE' button will dump the GLOBAL PARAMETERS.
PARAMETER SELECT	Juno 2 The Button Labeled “PARAMETER SELECT” is used to enter edit mode of the Kiwi-2. Every parameter can be edited via the front panel. To exit parameter edit mode press the Parameter Select button while in edit mode. MKS-50 Pressing the PARAM UP or DOWN enters Parameter Editing mode. To enter the parameter numbers the PARAM Up or PARAM Down can be pushed to step Parameter numbers or the number can be entered similar to a tone select using the GROUP, BANK & PARAM (1-8) select buttons	Each parameter has a 3 number identification. These are selected using the Group, Bank & Tone buttons the same way a tone is selected. The Edit Map parameter numbers are details on the Edit Map. An example is VCF Cutoff which has the ID 2:1:2 which is Group 2, Bank 1 and Tone 2.

KIWI-2 BUTTONS		
MIDI	Juno 2 To enter this mode press and release the MIDI button MKS-50 To enter this mode long press the TUNE/MIDI button The MIDI edit mode allows the synth global midi options to be set. These will be memorised and retained when the power is turned off. The button will cycle though the five global midi parameters and the values are changed using the Alpha Dial on the Juno 2 or the VALUE UP/DOWN on the MKS-50. 1) Midi In – This can be 1-16 or Omni If omni is set any midi channel is recognised by the Kiwi-2 2) Midi Out - This can be 1-16	3) Soft Through – There are four possible options. Stop All – No incoming midi is sent out the Midi Out Pass All – All incoming midi is sent out the Midi Out Pass Only Non CC – All Midi except CC is passed to Midi Out Stop Used CC – All Midi is passed to Midi Out except CC commands that are recognised and used by the Synth 4) Program Change Enable – There are four possible options. Off – No program change is sent or received In Only – Program Change commands are received but not sent Out Only – Program Change commands are sent but not received Both In & Out – All Program Commands are both sent & received 5) CC Enable – There are four possible options. Off – No MidiCC is sent or received In Only – MidiCC are received but not sent Out Only – MidiCC are sent but not received Both In & Out – All MidiCC are both sent & received
VALUE BUTTON	Juno 2 Only	The 'VALUE' button is used to set the MASTER CLOCK speed with the ALPHA DIAL. The range is 5-299 Beats Per Minute (BPM)
NAME BUTTON	Juno 2 & MKS-50	This button edits the name of the currently loaded tone. Juno-2. Press PARAMETER SELECT to step left and VALUE to step right. Use the ALPHA Dial to edit the character. MKS-50 Press PARAM UP/DOWN to change edit point and VALUE UP/DOWN to edit the character.

KIWI-2 BUTTONS		
WRITE BUTTON	Juno 2 and MKS-50 For writing a Tone to permanent memory in normal play mode press 'WRITE' then enter the Set, Group, Bank and Tone number (1111-2888). 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.	When the Kiwi-2 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 '1-3' buttons. The Kiwi-2 supports loading dumps in from the following dump formats. Roland MKS-30, Roland JX-8P, JX-10 & MKS-70, Kiwi-2, 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. Firmware can be updated by putting the Kiwi-2 into Update Mode. In the Juno 2 and MKS-50 Update Mode is entered by pressing and holding the WRITE Button while the synth is powered on.
VALUE UP/DOWN BUTTONS	MKS-50 Only The 'UP' and 'DOWN' buttons have different operations depending on the mode the Kiwi-2 is currently in. TONE MODE 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.	NAME EDIT MODE 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. 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-2 BUTTONS		
BUTTONS '1' to '8'	Juno 2 and MKS-50 The buttons '1-8' have different operations depending on the mode the Kiwi-2 is currently in. **TONE MODE** 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 (MKS-50 only) or midi commands to quickly step between Tones.	**DUMP MODE** The '1-3' 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.
ARPEGGIATOR	Juno 2 Only In the Juno-1/2 there are dedicated buttons for the ARP. ARP ON/OFF (MOD RATE) This button will start and stop the ARP playing. ARP RANGE (MOD DEPTH) This button will enable edit of the ARP RANGE using the ALPHA DIAL. Press ARP RANGE again to exit this mode.	ARP MODE (BRILLIANCE) This button will enable edit of the ARP MODE using the ALPHA DIAL. Press ARP MODE again to exit this mode.
CANCEL	Juno 2 On the Juno-1/2 the ENV TIME button is used as the CANCEL button.	The CANCEL button will exit any sub menu back to the normal play mode.

Kiwi-2 Upgrade Notes

## Digital Oscillators	The Juno-1/2 and MKS-50 Synthesizers uses programmable dividers from crystal locked master oscillator 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 Juno-2 & MKS-50 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-2 Upgrade Notes

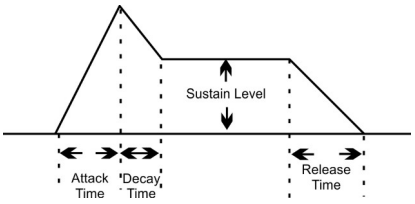
Display	The Kiwi-2 display provides feedback and instructions that make navigating the menu easier. On normal play the display will show the Tone Number & Name on the display.
	
	The left most digits contain the tone number and status information.
	
	Normal Play
	Example Display
	
	1342 HCA TONE NAME
	
	1324 = Tone Number (SGBT)
	H = Hold On
	C = Chord Set
	A = Arp Playing
	Note H, C & A will only show if the sections are active.
		Parameter Edit
		Example Display
		
		111 RANGE 16'
		
		111 = Parameter Number. The list of Parameter numbers can be found on the edit map.
		
		Sysex Dump
		Example Displays
		
		`MIDI DUMP <1-3>`
		`TONE EDIT DUMP`
		
		Select dump type 1-3 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-2 is done by holding the 'WRITE' and the 'BANK/SET' buttons down while powering on the synth. **This will wipe all Tones in the synth and replace them with 'blank' Tones. This will also reset all the Global parameters to their default settings.**
Midi Panic	MKS-50 Only Pressing the NAME button twice will cancel any sounding notes.	
Note Hold	The JUNO-2 and MKS-50 have no Note Hold except when using a midi hold pedal. In the Kiwi-2 'H' will show on the display after the Tone number when Hold mode is on.	

Kiwi-2 Upgrade Notes

Edit Buffer Compare	Whenever the edit buffer does not match the saved Tone showing on the display a '*' will flash between the tone number and the tone name.	To retain these changes when the Tone is changed or the Kiwi-2 is powered off the Tone must be written to memory. This is done by pressing of the Write button followed by the Set (optional), Group (optional), Bank (optional) & Tone numbers entered using BANK/SET button and the buttons 1-8. The Tone is written to memory on the tone number button press which allows a Tone to be moved and written to any location in memory.
LFO Generators	The Kiwi-2 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-2 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

Kiwi-2 Upgrade Notes

Envelopes	The Kiwi-2 has three independent Envelope Generators. The Envelopes generated are also available as Matrix sources. Envelopes 1-3 are the traditional ADSR type.	
Write Protect	Juno-1/2 Only The WRITE PROTECT switch on the rear of the Juno 1/2 must be in the OFF position to write to the Kiwi-2 memory.	If a WRITE is attempted with the Write Protect on an error message will display.
Master Tune	Juno 2 and MKS-50 For the Juno 1/2 press the button labeled TUNE and adjust the Master Fine Tune parameter using the ALPHA dial. For the MKS-50 press the button labeled TUNE and adjust the Master Fine Tune parameter using the UP and DOWN buttons.	The Master Tune parameter can also be set using Parameter number 444 or by a midi edit.

Arpeggiator

The KiwiTechnics Kiwi-2 Upgrade Juno-2 version has a built in Arpeggiator that can be applied to any sound.

In the Juno-2 the Arpeggiator is started and stopped by pressing the 'ARP ON/OFF' (MOD RATE) Button.

In the MKS-50 the ARP can only be started or stopped using midi.

The clock for the Arpeggiator is always the Master Clock and this can be divided using Patch Parameter 434 Edit or midi editing. There are 13 different ratios including swing options.

```
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 & ARP RANGE buttons and the APLHA Dial on the Juno 1/2 or for the MKS-50 these can be set using midi.

The ARP MODE will set the style and the options are UP only, DOWN only, UP & DOWN, RANDOM and AS PLAYED. The ARP RANGE options are 1, 2, 3 or 4 octaves. These are displayed and saved with the Tone.

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.

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

Chord Mode		
	Juno-2 Only A Chord is set in TONE MODE by playing the Chord and then pressing and releasing the CHORD MEMORY 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 chord button light will be on.	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 CHORD MEMORY Button while the chord keys are pressed. **Canceling Chord Mode.** To cancel chord mode press and release the CHORD MEMORY Button 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. Juno 2 To edit this parameter press PARAMETER, SELECT GROUP (CARTRIDGE) Button, '2' then Bank Button '1' then Tone Button '2'. Then edit the value using the ALPHA DIAL MKS-50 Select the Parameter number using the PARAM Up/Down button and change the value using the 'UP' & 'DOWN' buttons. Holding down the Param, Up or Down buttons will speed up the changes.

Parameter Editing

DCO Parameters

111 – DCO Range	0-3 0=32', 1=16', 2=8', 3=4'
112 – DCO Saw Wave	0-5 Saw types with #3=PW
113 – DCO Pulse Wave	0-3 Pulse types with #3=PW
114 – DCO Sub Wave	0-5 Sub Waves
115 – DCO Sub Level	Sub level 0-3
116 – DCO Tune	0-48 ± 1 Oct in half tone steps
117 – DCO LFO Amount	Range is 0-127
118 – DCO LFO Select	Options are LFO1, 2 or 3
121 – DCO ENV Amount	Range is 0-127
122 – DCO ENV Select	Options are ENV1,2 or 3
123 – DCO PW Amount	Range is 0-127
124 – DCO PWM Amount	Range is 0-127
125 – DCO PWM Source Select	Options are ENV1, 3, LFO 2, 3
126 – DCO Frequency Dynamics	Range is 0-127
127 – Noise Level	Range is 0-3
131 – Detune	Range is 0-127
132 – Analog Feel	Range is 0-127
133 – Bend Range	Range is 0-127
134 – Patch Clock	Range is 1-127 which is 6-299 BPM 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.
135 – Voice Mode	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. 0=Poly Single 1=Poly Dual 2=Poly Triple 3=Unison 4=Solo
136 – Voice Steal Mode	0=Steal Oldest 1=Steal Newest 2=Steal Highest 3=Steal Lowest 4=Steal Quietest 5=Steal Off (7th note ignored)
137 – Voice Staccato / Legato	0=Staccato, 1= Legato
138 – Portamento	Range is 0-127
142 – VCA Output Level	Range is 0-127
143 – VCA LFO Level	0-2 (LFO1-3)
144 – VCA LFO Select	0-3 (0=Gate, 1-3=ENV 1-3)
145 – VCA ENV Select	Range is 0-127
146 – VCA Dynamics	

Parameter Editing

VCF Parameters	211 – HPF Cutoff	Range is 0-3
	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 Tracking	Range is 0-127
	221 – VCF Dynamics	Range is 0-127
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 Down Velocity 6=Key Up Velocity 7=Key Note 8=LFO1 (bipolar) 9=LFO1 (unipolar) 10=LFO2 (bipolar) 11=LFO2 (unipolar) 12=LFO3 (bipolar) 13=LFO3 (unipolar) 14=ENV1 15=ENV2 16=ENV3 17=MidiCC#1 18=MidiCC#2 19=MidiCC#3 20=MidiCC#4 21=MidiCC#5 22=MidiCC#6 23=Midi Channel After Touch 24=Midi Note After Touch 25=Key Gate 26=Hold Pedal 27=Pedal Switch 28=Expression Pedal Level
	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

Parameter Editing

	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 346 – Matrix 9 Destination	Matrix Destination options are 0=Off 1=DCO Freq 2=DCO Range 3=DCO Saw Wave 4=DCO Pulse Wave 5=Sub Wave 6=DCO LFO Level 7=DCO ENV Level 8=DCO PW Level 9=DCO PWM Level 10=Detune amount 11=HPF Cutoff 12=VCF Cutoff 13=VCF Resonance 14=VCF LFO Level 15=VCF ENV Level 16=VCF KEY Level 17=VCA Level 18=VCA LFO Level 19=Port Rate 20=LFO1 Rate 21=LFO2 Rate 22=LFO3 Rate 23=ENV1 Attack Rate 24=ENV1 Decay Rate 25=ENV1 Sustain Level 26=ENV1 Release Rate 27=ENV2 Attack Rate 28=ENV2 Decay Rate 29=ENV2 Release Rate 30=ENV2 Release Rate 31=ENV3 Attack Rate 32=ENV3 Decay Rate 33=ENV3 Release Rate 34=ENV3 Release Rate 35=Chorus Rate
Chorus Rate	431 Chorus Rate	Range 0-127
Chorus Mode	428 Chorus Mode	Range 0-1 0=Off, 1=On
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

Parameter Editing		
ARP Step Timing	434 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

Global Parameters Edit		
Midi Clock Gen	441 Midi Clock Generation	Options are Off, On The Kiwi-2 will output a midi clock which is set by the internal clock rate when this parameter is set On
Master Clock Source	442 Master Clock Source	Options are Internal or Midi. Note – If midi is selected and there is no midi clock present then Arp or Sync'd LFOs will not run
Master Clock Rate	443 Master Clock Rate	Range is 0-127 which is 5-299 BPM
Master Fine Tune	444 Master Fine Tune	Range is 0-127 64=A440
Guitar Mode	445 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.
CART Import	446 CART Import	When this parameter is selected and WRITE is pushed the contents of the CART will be converted into the current Set & Group starting at 1:1.

Tone Dump Importing

Tone Dump Imports

The Kiwitechnics Kiwi2 upgrade is capable of loading in Juno-2, Kiwi-2, Kiwi-30, 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 Kiwi-2.

Note – Tones that rely only on the filter self resonating to create sound will not work due to a limit in the MKS50/Juno2 filter hardware that does not allow it to self oscillate.

There are some caviates though. Because the tone layout and sound generation in the Kiwi-2 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. The Juno-2 only has a single DCO so tones that rely on cross mod or use DCO2 as the main sound will not convert well.

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 Kiwi-2 uses. The number is divided by 512 and the result is the Set number (1-2), 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 Kiwi-2 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-2 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 display after the Tone number while the hold is on.

Firmware Updates

	Firmware Updates The Kiwi-2 is put into update mode by pressing and holding the WRITE button as the Kiwi-2 is powered on. The update file can then be played into the Midi In port. As the files are playing into the Kiwi-2 the Display will show the progress. If the update has no errors then 'good' will display. If there was an error then 'Error' will display and the update should be retried. Note – If the Display shows 'Error' 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.

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.

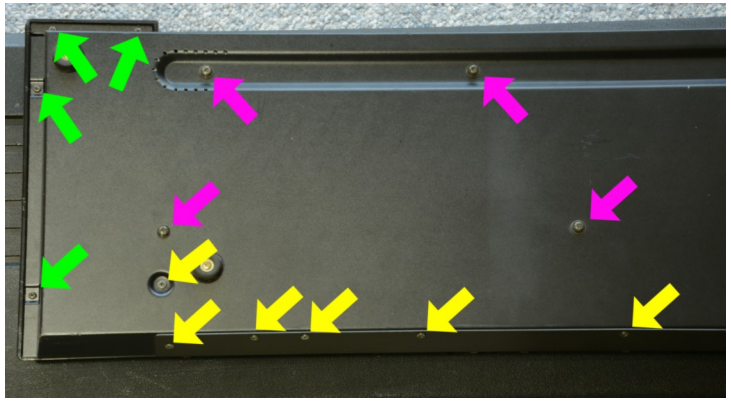
The KiwiTechnics Kiwi-2 Upgrade must be installed by a competent technician with the correct tools or damage to your Juno-2 or MKS-50 can occur.

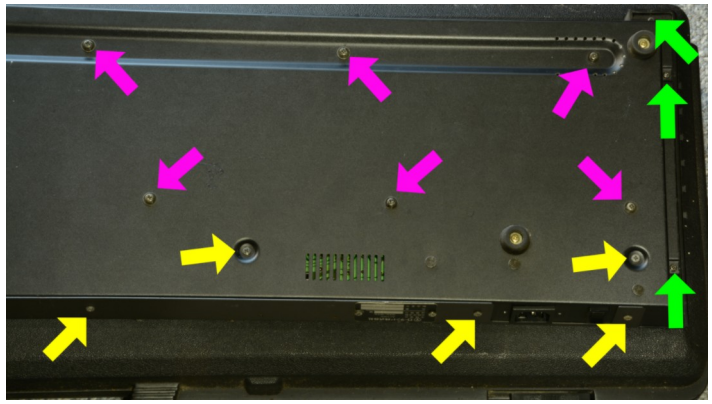
UNPLUG THE JUNO-2 or MKS-50!

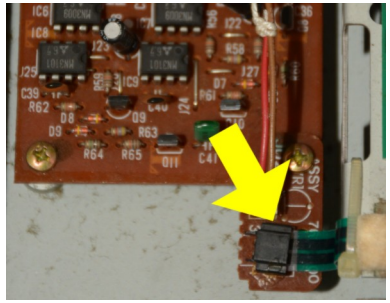
There are dangerous voltages inside the units and they must not be opened until the power plug is removed from the power supply.

1) Juno-2. Opening the Juno-2

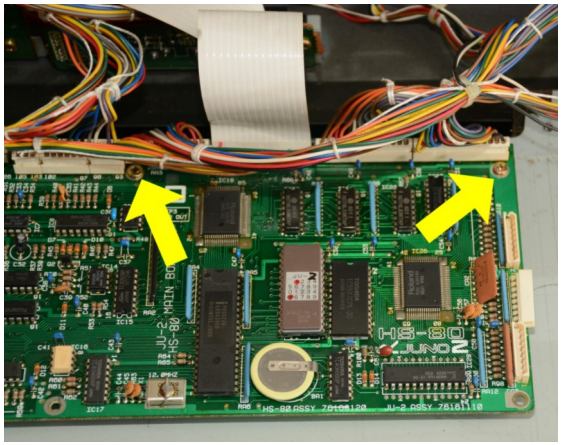
The Juno-2 is opened by removing the screws on the underside. There are a few of these and there are 3 different types that must not be mixed.
With something under the bender lever to protect it place the synth upside down. A rolled up towel or similar works well to protect the bender.
1) Remove the 7 screws marked with green arrows first and bag these separately for reinstalling.
2) Next remove the 11 screws marked with Yellow Arrows and bag these separately for reinstalling.
The top will now be free but it is necessary to also remove the keyboard. While holding the top on turn the synth over.
Lift the top up at the ends and roll it back. It should sit there being held by all the wires.
3) Remove the small green connector that joins the keyboard to the Aftertouch circuitry (see photo).
Replace the top and while holding the top roll the synth over again protecting the bender lever.
4) Remove the 10 screws marked with purple arrows. These are shown in the photos and they are all in two rows. Bag these separately for reinstalling.







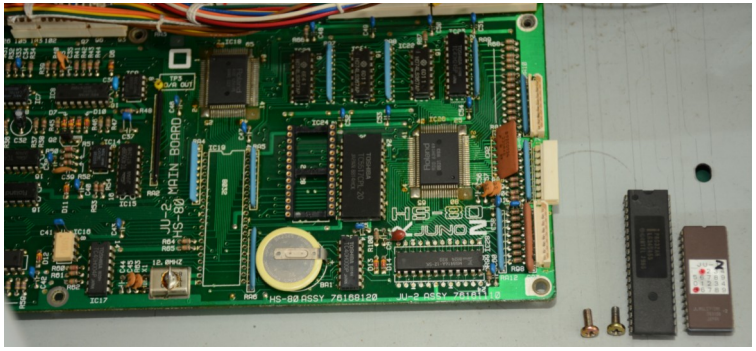
2) Juno-2 The Main Board



The main board in the Juno-2 is partially under the keyboard and care need to be taken removing it.
1) Remove the three screws along the rear of the main board and slide the board out from under the keyboard forward to the point where the three plugs that connect the keyboard to the main board can be accessed. Remove these and then remove the keyboard by sliding it out.

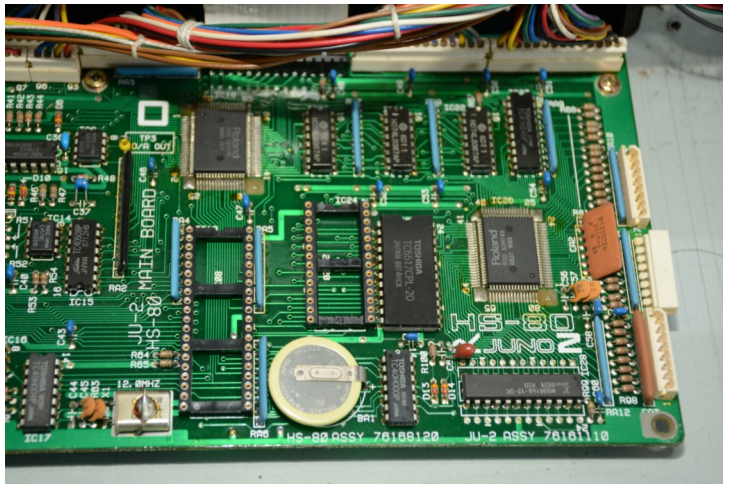
2) Remove the three screws (yellow arrows) that hold the main board to the base (see photo – note only two screws shown). The cpu board can now be rolled back so that the underside can be accessed. While this board can be unplugged and fully removed it is just as easy to desolder the cpu while it is still part of the synth.

3) Desolder IC19 which is a 40pin 8032 cpu.



On the top side of the board underneath the IC19 CPU 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 and the pins free of the hole edges before the CPU is lifted.** The CPU pins should be able to move freely in the hole 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 hand vacuum can be used but these can cause damage to the board as they can jump and damage tracks as they are triggered. Quality Solder wick is a better approach than a hand desolderer.

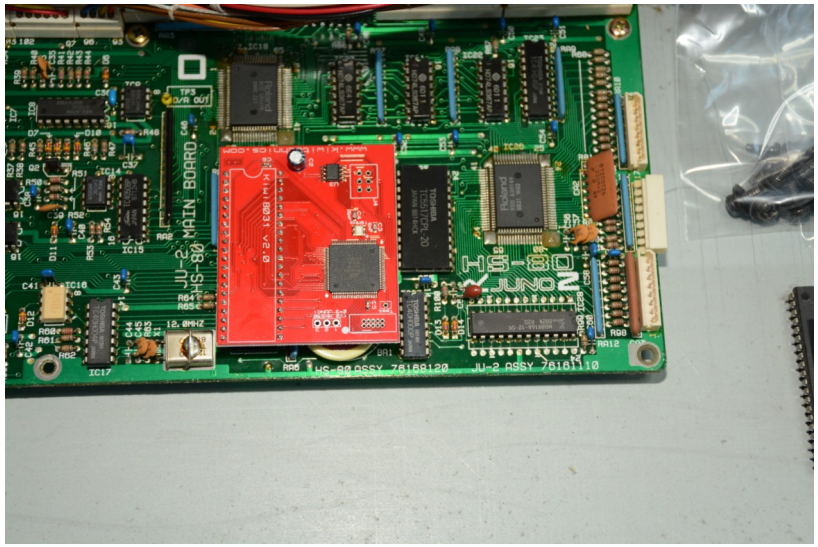
HINT



The trick with soldering and desoldering on these old boards is to not let things get too hot. The board and the copper both get soft at 300°+ and are easily damaged. Do not keep retrying a pin that will not work the first time. Work on other pins, let that one cool and try again when it has cooled. If it will not desolder try resoldering it with fresh solder, let it cool and try again. As a last resort cut the cpu pin as close to the cpu as you can with fine cutters, remove the pin from the hole by hooking it out with a hot soldering iron using the cut bent top, let it cool and then desolder the hole.

4) Solder in the supplied 40 pin socket making sure the end with the notch matches the marking of a notch on the circuit board.

5) Fit the Kiwi-2 cpu board into the socket making sure the notch on the Kiwi-2 board is at the same end as the markings on the Juno-2 main board. 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 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.



6) Loosely refit the three screws that hold on the main board. Then refit the keyboard, stopping half way to replug in the keyboard wires. Once the keyboard is fully in tighten the 3 screws holding the cpu board and make sure the cpu or Juno-2 Main board are not touching any part of the keyboard.

3) Juno-2. Closing the Juno-2

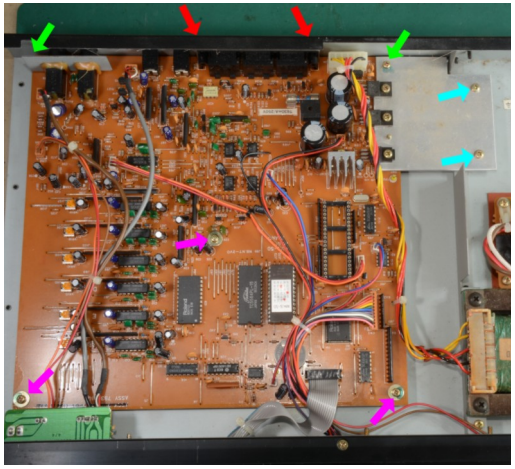
1) Protect the bend lever and replace but do not fully tighten the 10 screws marked with purple arrows. These are not all shown in the photos but they are all in two rows. The keyboard position can be finally adjusted later.

2) Turn the synth over and lift the top again. Replace the small green connector that joins the keyboard to the Aftertouch circuitry. Put the end into the socket and then slide it into the socket.

3) Turn the synth back upside down and protect the bend lever. Now replace all the yellow and green screws. Do not over tighten the green screws as these are screwing into plastic which can be easily broken.

The keyboard can now be positioned and finally tightened.

1) MKS-50.



1) The MKS-50 is opened by removing the two mounting bracket strengthener s which are held on by 3 screws for each bracket (6 in total). These are located on the sides of the MKS-50. Keep these screws in their own bag as they are a different size and must not be mixed with other screws.

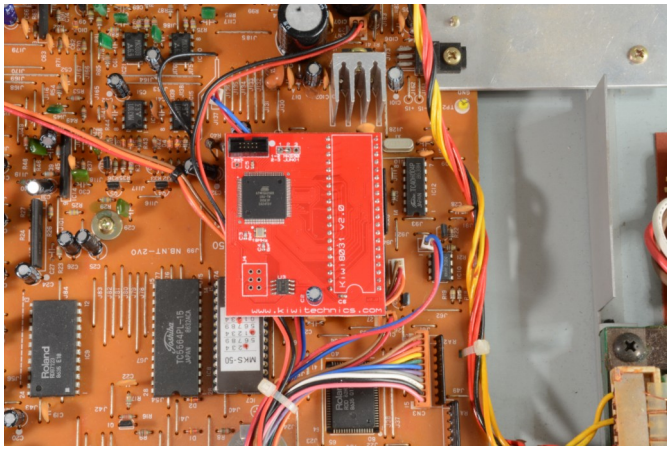
The top cover can then be removed by removing the 8 smaller screws on the underside. Keep these in their own bag for reassemble. Once the 8 screws are removed the cover can be slid back towards the rear of the MKS-50 and put aside.

2) The next screw types are all different and should all be kept separate.

Remove the two black screws at each end of the midi plugs on the rear (marked with red arrows).
Remove the 3 screws holding down the main board at the front and center (marked with purple arrows).
Then remove the screw at the rear that is holding the metal bracket for the audio out sockets and the other marked with the green arrow. Next remove the two screws holding down the heatsink plate (marked with cyan arrows).

4) The board can now be rolled over and the 40 pin can now be desoldered. Because this is a single sided circuit board with no through plating this should be fairly straight forward and should not cause any issues.

5) Next solder in the supplied 40pin socket making sure that the notch is at the same end as the marking on the board. This is nearest to the front panel. Use the desoldering hints for the Juno-2 as these also apply for thew MKS-50. Because the circuit board is made from resin rather than fiberglass it is even more sensitive to heat.



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 MKS50 main board supported behind 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 position.

7) Assembly is the reverse of disassembly. Make sure you use the same type of screws that were removed at each stage.

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
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
DCO Tune	$08 (08)	$00-$30 (0-48)	x=0-48 (-12 → +12 notes in half semitone steps)
DCO LFO	$09 (09)	$00-$7f (0-127)	
DCO ENV	$0a (10)	$00-$7f (0-127)	
DCO PW	$0b (11)	$00-$7f (0-127)	
DCO PWM	$0c (12)	$00-$7f (0-127)	
DCO DYN	$0d (13)	$00-$7f (0-127)	
DCO Detune	$0e (14)	$00-$7f (0-127)	
Noise Level	$0f (15)	$00-$03 (0-3)	
Sub Level	$10 (16)	$00-$03 (0-3)	
VCA LFO Amount	$11 (17)	$00-$7f (0-127)	
VCA DYN	$12 (18)	$00-$7f (0-127)	
VCF Low Pass Cutoff	$13 (19)	$00-$7f (0-127)	
VCF Low Pass Resonance	$14 (20)	$00-$7f (0-127)	
VCF LFO	$15 (21)	$00-$7f (0-127)	
VCF ENV	$16 (22)	$00-$7f (0-127)	
VCF KEY	$17 (23)	$00-$7f (0-127)	
VCF HPF	$18 (24)	$00-$7f (0-3)	
VCF DYN	$19 (25)	$00-$7f (0-127)	
ENV 1 Attack	$1a (26)	$00-$7f (0-127)	
ENV 1 Decay	$1b (27)	$00-$7f (0-127)	
ENV 1 Sustain	$1c (28)	$00-$7f (0-127)	
ENV 1 Release	$1d (29)	$00-$7f (0-127)	
ENV 2 Attack	$1e (30)	$00-$7f (0-127)	
ENV 2 Decay	$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
ENV 2 Sustain	$21 (33)	$00-$7f (0-127)	
ENV 2 Release	$22 (34)	$00-$7f (0-127)	
ENV 3 Attack	$23 (35)	$00-$7f (0-127)	
ENV 3 Decay	$24 (36)	$00-$7f (0-127)	
ENV 3 Sustain	$25 (37)	$00-$7f (0-127)	
NRPN LSB	$26 (38)	$00-$7f (0-127)	Not Supported.
ENV 3 Release	$27 (39)	$00-$7f (0-127)	
LFO 1 Rate	$31 (49)	$00-$7f (0-127)	
LFO 1 Delay	$32 (50)	$00-$7f (0-127)	
LFO 2 Rate	$33 (51)	$00-$7f (0-127)	

Continuous Controllers

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

Continuous Controllers

Continuous Controllers	Second	Third	Notes
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
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
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)
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)

Continuous Controllers

Continuous Controllers	Second	Third	Notes
DCO PWM Source	$5c (92)	$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
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
Chorus Control	$6a (106)	$yy	yy = $00-$3f (0-63) Off $40-$7f (64-127) On
Chorus Rate	$6b (107)	$00-$7f (0-127)	
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 Play
Stop	$fc (252)		Stop Arp Play
Continue	$fb (251)		Continue Arp 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	
	$09	Product Family ID (Kiwi-2)	
	$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
	$09	Kiwitechnics Kiwi-2 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 $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-2 becomes unusable due to non valid data you may need to do a full restore of the Kiwi-2 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-2 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) = Enable MidiCC	000000xx	xx = 00=Off 01=CC Receive Enabled (Default) 10=CC Transmit Enabled 11=CC Receive & Transmit Enabled
	$03 (3) = Enable Program Change	000000xx	xx = 00=None 01=PC Receive Enabled (Default) 10=PC Transmit Enabled 11=PC Receive & Transmit Enabled
	$04 (4) = 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-2 will not be passed Note – Active Sensing commands are suppressed within the Kiwi-2 and are not passed on
	$05 (5) = Enable Midi Clock Gen	0000000x	x = Off/On (set=On)
	$06 (6) = Master Clock Source	0000000x	x= 0-Internal 1-Midi
	$07 (7) = 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
	$08 (8) = 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
	$09 (9) = Master Fine Tune	0xxxxxxx	x = 0-201 Master Fine Tune (+- 100 cents)
	$0a (10) = Guitar Mode	0000000x	x = Off/On (set=On) – Note this uses midi channels 1-6 only
	$0b-$1f (11-31) = Nulls		Not currently Used

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
$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) = DCO Wave	000yyyzz	zz = Pulse Wave 00 = Off 01 = Square Wave 10 = Pulse Wave 11 = Pulse Width/PWM yyy = Saw Wave 000=Off 001=Saw 010=Saw+Pulse1 011=Saw+Pulse2 (+PW) 100=Saw+Pulse3 101=Saw+Pulse4
	$11 (17) = DCO Sub Wave	00000xxx	xxx = Sub Wave 000=Sqr -1 001=Pulse1 -1 010=Pulse2 -1 011=Pulse3 -1 100=Sqr -2 101=Pulse -2
	$12 (18) = DCO Range	000000xx	xx = 00 = 32' 01 = 16' 10 = 8' 11 = 4'
	$13 (19)=DCO Tune	0xxxxxxx	x=0-48 (-12 → +12 notes in half semitone steps)
	$14 (20)=DCO LFO Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$15 (21)=DCO ENV Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$16 (22)=DCO PW Amount	000000xx	x = Range $00-$03 (0-3)
	$17 (23)=DCO PWM Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$18 (24)=DCO DYN Amount	0xxxxxxx	x = Range $00-$7f (0-127)

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$19 (25)=DCO Control	0wwxyyzz	zz = DCOEnv(00=Env1,01=Env2,10=Env3) yy = DCOLFO(00=LFO1,01=LFO2,10=LFO3) x = DCOEnv Pol(0=Norm,1=Inverted) ww = DCOPWM Src(00=Env1,01=Env3,10=LFO2,11=LFO3)
	$1a (26)=Detune Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$1b (27)=Sub Level	000000xx	x = Range $00-$03 (0-3)
	$1c (28)=Noise Level	000000xx	x = Range $00-$03 (0-3)
	$1d (29)=VCF Cutoff Hi	000xxxxx	
	$1e (30)=VCF Cutoff Lo	0yyyyyyy	Hi & Lo are combined to make single 12 bit command. 000xxxxx + 0yyyyyyy = 0000xxxx xyyyyyyy x = Range $0-$fff (0-4095)
	$1f (31)=VCF Resonance Hi	000xxxxx	
	$20 (32)=VCF Resonance Lo	0yyyyyyy	Hi & Lo are combined to make single 12 bit command. 000xxxxx + 0yyyyyyy = 0000xxxx xyyyyyyy x = Range $0-$fff (0-4095)
	$21 (33)=VCF LFO Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$22 (34)=VCF ENV Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$23 (35)=VCF KEY Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$24 (36)=VCF DYN Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$25 (37)=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)
	$26 (38)=VCA Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$27 (39)=VCA LFO Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$28 (40)=VCA Control	0000yyzz	zz = VCAENV(00=Gate,01=Env1,10=Env2,11=Env3) yy = VCALFO(00=LFO1,01=LFO2,10=LFO3)
	$29 (41)=VCA DYN Amount	0xxxxxxx	x = Range $00-$7f (0-127)
	$2a (42)=HPF Level	000000xx	x = Range $00-$03 (0-3)
	$2b (43)=Matrix 0 Source	000xxxxx	x = 0-23 – See Table 1
	$2c (44)=Matrix 0 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$2d (45)=Matrix 0 Destination	000xxxxx	x = 0-26 – See Table 3
	$2e (46)=Matrix 1 Source	000xxxxx	x = 0-23 – See Table 1
	$2f (47)=Matrix 1 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$30 (48)=Matrix 1 Destination	000xxxxx	x = 0-26 – See Table 3

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$31 (49)=Matrix 2 Source	000xxxxx	x = 0-23 – See Table 1
	$32 (50)=Matrix 2 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$33 (51)=Matrix 2 Destination	000xxxxx	x = 0-26 – See Table 3
	$34 (52)=Matrix 3 Source	000xxxxx	x = 0-23 – See Table 1
	$35 (53)=Matrix 3 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$36 (54)=Matrix 3 Destination	000xxxxx	x = 0-26 – See Table 3
	$37 (55)=Matrix 4 Source	000xxxxx	x = 0-23 – See Table 1
	$38 (56)=Matrix 4 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$39 (57)=Matrix 4 Destination	000xxxxx	x = 0-26 – See Table 3
	$3a (58)=Matrix 5 Source	000xxxxx	x = 0-23 – See Table 1
	$3b (59)=Matrix 5 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$3c (60)=Matrix 5 Destination	000xxxxx	x = 0-26 – See Table 3
	$3d (61)=Matrix 6 Source	000xxxxx	x = 0-23 – See Table 1
	$3e (62)=Matrix 6 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$3f (63)=Matrix 6 Destination	000xxxxx	x = 0-26 – See Table 3
	$40 (64)=Matrix 7 Source	000xxxxx	x = 0-23 – See Table 1
	$41 (65)=Matrix 7 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$42 (66)=Matrix 7 Destination	000xxxxx	x = 0-26 – See Table 3
	$43 (67)=Matrix 8 Source	000xxxxx	x = 0-23 – See Table 1
	$44 (68)=Matrix 8 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$45 (69)=Matrix 8 Destination	000xxxxx	x = 0-26 – See Table 3
	$46 (70)=Matrix 9 Source	000xxxxx	x = 0-23 – See Table 1
	$47 (71)=Matrix 9 Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$48 (72)=Matrix 9 Destination	000xxxxx	x = 0-26 – See Table 3
	$49 (73)=ENV1 Attack	0xxxxxxx	x = Range $00-$7f (0-127)
	$4a (74)=ENV1 Decay	0xxxxxxx	x = Range $00-$7f (0-127)
	$4b (75)=ENV1 Sustain	0xxxxxxx	x = Range $00-$7f (0-127)
	$4c (76)=ENV1 Release	0xxxxxxx	x = Range $00-$7f (0-127)
	$4d (77)=ENV2 Attack	0xxxxxxx	x = Range $00-$7f (0-127)
	$4e (78)=ENV2 Decay	0xxxxxxx	x = Range $00-$7f (0-127)

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$4f (79)=ENV2 Sustain	0xxxxxxx	x = Range $00-$7f (0-127)
	$50 (80)=ENV2 Release	0xxxxxxx	x = Range $00-$7f (0-127)
	$51 (81)=ENV3 Attack	0xxxxxxx	x = Range $00-$7f (0-127)
	$52 (82)=ENV3 Decay	0xxxxxxx	x = Range $00-$7f (0-127)
	$53 (83)=ENV3 Sustain	0xxxxxxx	x = Range $00-$7f (0-127)
	$54 (84)=ENV3 Release	0xxxxxxx	x = Range $00-$7f (0-127)
	$55 (85)=LFO 1 Wave	000000xxx	xxx = 000=Sine 001=Triangle 010=Square 011=Saw 100=Reverse Saw 101=Random 110=Fast Random
	$56 (86)=LFO 1 Rate	0xxxxxxx	x = Range $00-$7f (0-127)
	$57 (87)=LFO 1 Delay	0xxxxxxx	x = Range $00-$7f (0-127)
	$58 (88)=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
	$59 (89)=LFO 2 Wave	000000xxx	xxx = 000=Sine 001=Triangle 010=Square 011=Saw 100=Reverse Saw 101=Random 110=Fast Random

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$5a (90)=LFO 2 Rate	0xxxxxxx	x = Range $00-$7f (0-127)
	$5b (91)=LFO 2 Delay	0xxxxxxx	x = Range $00-$7f (0-127)
	$5c (92)=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
	$5d (93)=LFO 3 Wave	000000xxx	xxx = 000=Sine 001=Triangle 010=Square 011=Saw 100=Reverse Saw 101=Random 110=Fast Random
	$5e (94)=LFO 3 Rate	0xxxxxxx	x = Range $00-$7f (0-127)
	$5f (95)=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
	$60 (96)=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
	$61 (97)=Portamento Rate	0xxxxxxx	x = Range $00-$7f (0-127)
	$62 (98)=Portamento Control	0000000x	x = 0=On/Off (Set=On)
	$63 (99)=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
	$64 (100)=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)
	$65 (101)=Arp Control	00yyy0zz	zz = 00=1Oct,01=2Oct,10=3Oct yyy = 000=Up,001=Dn,010=U/D,011=Rndm,100=As Played
	$66 (102)=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
	$67 (103)=Patch Clock TempoLo	0000yyyy	

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
	$68 (104)=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)
	$69 (105) Analog Feel Level	0xxxxxxx	x = Range $00-$7f (0-127)
	$6a (106) Bend Range	0xxxxxxx	x = Range $00-$7f (0-127) (127=±1 Octave)
	$6b (107) Chorus Control	0000000z	z = 0 = Off, 1=On
	$6c (108) Chorus Rate	0xxxxxxx	x = Range $00-$7f (0-127)
	$6d-$7f (109 -127)		Not Used
$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-2 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-2 transmits data in the same format as the $04 Command
$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-2 transmits a $0e (14) command

Table 1.0 Command ID	Data Byte	Data Type Byte details 7 ------- 0	Data Details
$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-2 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
	$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 Up Velocity[14]
7	Key Note[1]
8	LFO1 (bipolar)
9	LFO1 (unipolar)
10	LFO2 (bipolar)
11	LFO2 (unipolar)
12	LFO3 (bipolar)
13	LFO3 (unipolar)
14	ENV1[1]
15	ENV2[1]
16	ENV3[1]
17	MidiCC#1
18	MidiCC#2
19	MidiCC#3
20	MidiCC#4
21	MidiCC#5
22	MidiCC#6
23	Channel After Touch[4]
24	Midi Note After Touch[1]
25	Key Gate[1]
26	Hold Pedal[5]
27	Pedal Switch[5]
28	Expression Pedal Level[5]

Matrix Destination Types

0	Off
1	DCO Freq[2]
2	DCO Range[3]
3	DCO Saw Wave[3]
4	DCO Pulse Wave[3]
5	SUB Wave[3]
6	DCO LFO Level[3]
7	DCO ENV Level[3]
8	DCO Pulse Width Level[3]
9	DCO PWM Level[3]
10	DCO Detune[3]
11	VCF High Pass[3]
12	VCF Cutoff[2]
13	VCF Resonance[3]
14	VCF LFO Level[3]
15	VCF ENV Level[3]
16	VCF Key Level[3]
17	VCA Level[2]
18	VCA LFO Level[3]
19	Portamento Rate[3]
20	LFO1 Rate[3]
21	LFO2 Rate[3]
22	LFO3 Rate[3]
23	ENV1 Attack Rate[3]
24	ENV1 Decay Rate[3]
25	ENV1 Sustain Level[3]
26	ENV1 Release Rate[3]
27	ENV2 Attack Rate[3]
28	ENV2 Decay Rate[3]
29	ENV2 Sustain Level[3]
30	ENV2 Release Rate[3]
31	ENV3 Attack Rate[3]
32	ENV3 Decay Rate[3]
33	ENV3 Sustain Level[3]
34	ENV3 Release Rate[3]
35	Chorus Rate[3]

[1] = Source is per voice
[2] = Destination is per voice
[3] = Destination is used in all voices
[4] = Midi & Internal (Juno-2 only) mixed
[5] = Juno-1/2 only