Tubbutec JUNO-66

MIDI RETROFIT AND FEATURE EXTENSION FOR ROLAND JUNO-6 AND
JUNO-60

User Manual for firmware version v1.0

http://tubbutec.de

Contents

1   Juno-66

The Juno-66 is a midi retrofit and feature extension for the Roland Juno-6 and Juno-60 synthesizers. It features various additional play modes, a freely definable arpeggiator / sequencer, midi in and midi out,two chord memory modes, two additional filter LFOs and plenty other features.

This manual only describes the features different from the Juno-6 / 60. Great care has been taken to not alter the original behaviour of the synths with an exception of the key transpose function.

2 Juno-66 switches and buttons

The Juno-66 functions are controlled by the following switches and buttons
on the left side of the synth's panel:
KEY TRANSPOSE, HOLD, ARP ON/OFF, ARP MODE and ARP range.
The original function of the KEY TRANSPOSE button is replaced and it
now serves as a 'FUNCTION TRANSPOSE' button, allowing the control
of many additional functions. When the arpeggiator is switched off, the arp
button and switches double as switches to set the play mode, portamento,
and control the Powerarp sequencer. A sticker showing the most important
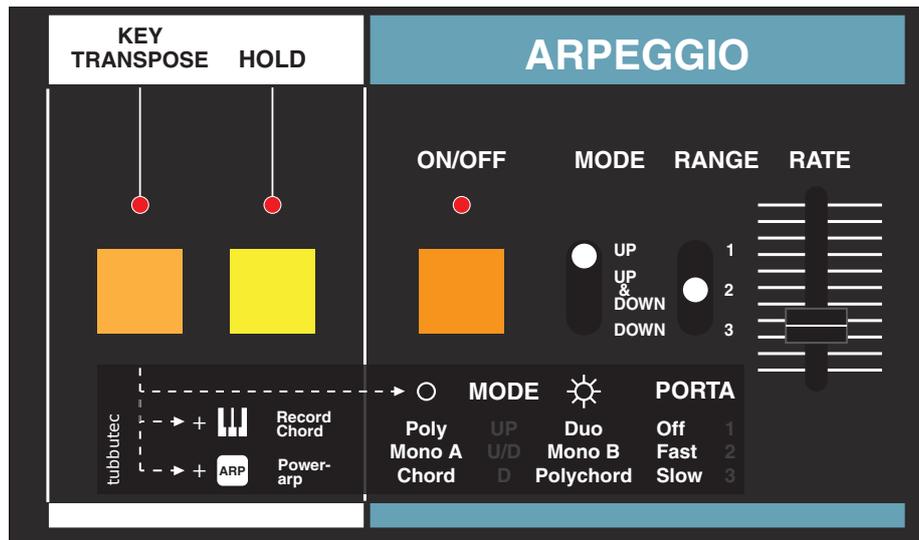additional features come with the kit.

Figure 1: Juno-66 controls

3 Play Modes

3.1 Play Modes Overview

In addition to the 6 voice polyphonic mode five new play modes are introduced with the Juno-66:

Two monophonic modes, a duophonic mode, chord memory and Polychord. When the arpeggiator is turned off, use the MODE switch and the KEY TRANSPOSE button to select the play mode. If the KEY TRANSPOSE led is off you can select the left column of modes (Poly, Mono A and Chord), by pressing the KEY TRANSPOSE button, the led turnes on and the second column (Duo, Mono B and Polychord) is selected. When the arpeggiator is turned on the play modes can still be selected, see below.
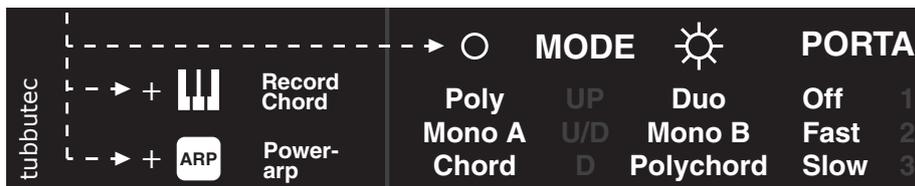

Figure 2: Play mode selection overview

3.2 Poly

Poly mode is the normal 6 voice polyphonic mode also used in the original synths. The voices are assigned in a rotary algorithm and voice stealing is performed on the 'oldest' voice.

3.3 Duo

The duophonic layers three oscillators per voice and detunes the voices to create a thicker, denser sound similar to the 'supersaw' or 'supersquare' modes often found in synthesizers. The fatness can be controlled by midi **??** or in the config menu **??**. By adjusting the fatness a wide range of sonds from 'clean' over 'fat' to 'dirty' and finally 'detuned' can be achieved. Voice stealing is performed so that only the second played voice is replaced, the first stays until released.

3.4 Mono A and B

In the monophic modes all six Oscillators are layered and detuned with respect to each other to achive a thicker, denser sound similar to the 'supersaw' or 'supersquare' modes often found in synthesizers. The fatness can be controlled by midi **??** or in the config menu **??**. By adjusting the fatness a wide range of sonds from 'clean' over 'fat' to 'dirty' and finally 'detuned' can be achieved.
The monophonic mode assignes the notes in a 'last played' fashion: Press a key and it will be played. When releasing a key and keys are still pressed, the last played note is played. The algorithm memorizes the last eight played keys to create an intuitive feeling.
In Mono mode A the envelope is retriggered each time a note is played, Mode B does not retrigger the envelope when playing legato.

3.5 Chord

The chord memory mode allows you to memorize a chord consisting of up to six notes and transpose it with the keyboard.

3.5.1 Save a Chord

To save a new chord first play it on the keyboard and either hold down the keys, press the HOLD button or use a sustain pedal to hold it. You can play the chord in any of the play modes including Polychord mode. Now while the notes are still on hold down the KEY TRANSPOSE button until it starts blinking. By pressing it again the chord is now saved and used in chord mode.

3.6 Polychord

The Polychord functionality allows you to assign an individual chord to each key of the keyboard and play these chords with a single key press. Like any other play mode Polychord can be used in conjunction with the Powerarp. Combining the two gives you a versatile chord sequencer!

3.6.1 Recording a new Chord

To save a new chord first play it on the keyboard and either hold down the keys, press the HOLD button or use a sustain pedal to hold it. You can play the chord in any of the play modes including Polychord mode. Now while the notes are still on hold down the KEY TRANSPOSE button until it starts blinking. You can now release the pressed keys. The blinking indicates the synth is waiting for the location you want to save the chord to. Press one of the keyboards keys, the chord will be saved at this location and the blinking stops. The last saved chord is also used in chord memory mode. The chords are saved even if you turn of the synthesizer.

3.7 Changing the play mode when arp is on

It is possible to change the play mode even when the arpeggiator is turned on. By pressing the KEY TRANSPOSE button, the play mode selected with the mode switch is selected and used from here on until you press the KEY TRANSPOSE button again or exit the arp.

4 Portamento

The Juno-66 features portamento for all play modes.
The portamento used in the Juno-66 is linear on the musical scale. This means that when sliding from e.g. C to E, the time spent between C and D is the same than between D and E.

4.1   Select portamento speeds

You can use the RANGE (PORTA) switch when the arpeggiator is turned off to switch on portamento and select its speed. When the range switch is set to 1, portamento is turned off. Setting it to 2 enables fast portamento, 3 slow portamento. The exact times for 'Slow' and 'Fast' can be set using midi **??** or the config menu **??**. You can use a midi controller to change the portamento speed/time instantly.
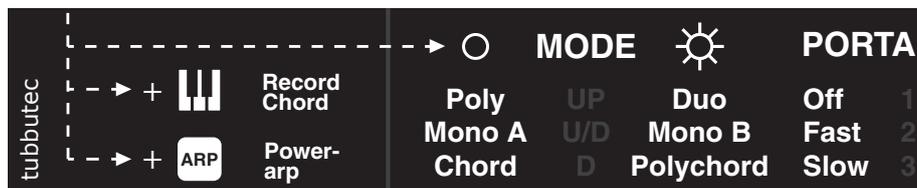

Figure 3: Portamento speed selection

4.2   Portamento and play modes

Portamento works in all play modes.

In Poly, Mono and Duo mode the last played note is used as the start for the slide. In Chord mode all the voices slide in paralel and the structure of the cord is preserved. In Polychord mode the structure is preserved if the two chords are transpositions of each other (e.g. two minor chords. Otherwise an extra algorithm makes sure that the lowest note of the first chord slides to the lowest of the second chord and so on. This is to make sure that even here a portamento sounds natural and you do not end up with musically unpleasant sounds while sliding.

4.3   Constant Time and Constant Speed

The Juno-66 features two portamento modes: 'Constant Time' and 'Constant Speed'.

In 'Constant time' mode it always takes the same amount of time to slide from one note to the next no matter how far they are apart.

In 'Constant speed' mode it takes a certain amount of time to slide from one semitone to the next, the overall time for the slide changes with the

distance of the notes played. The modes can be selected in the config menu **??**, 'Constant time' is set as default.

5 Powerarp

5.1 Powerarp overview

The Powerarp mode lets you define a custom arpeggiator sequence which - just like the normal arp - works in all play modes. You can define a sequence of up to 128 notes, transpose in pitch or shift it in time. The next note is triggered by the arp clock, midi clock via an adjustable divider or a midi note.

5.2 Creating a new sequence

While holding down KEY TRANSPOSE switch on the arp with the arp ON/OFF switch. The KEY TRANSPOSE led will start blinking. you can now enter your sequence note by note. Pressing the HOLD key while holding down a key will insert a tie and make the note longer by one step. Pressing HOLD without holding down a key will insert a break with the duration of one note. Note that you eigther have to only slightly press the HOLD key so it does not latch, press it a second time to switch it off again or use an external hold foot pedal. You can use this to program more complex rhythms, then a usual arpeggiator can provide. When finished press theKEY TRANSPOSE button again to save the sequence and get into Powerarp mode. The sequence will be saved, even if you switch off the Juno. .

5.3 playing and transposing

To play the sequence press the middle C (C3). To transpose the sequence press key above or below the middle C. By activating HOLD or using a HOLD pedal the seqence stays on even when no key is pressed. The two uppermost keys of the keyboard have a special function. The C will advance

the sequence by one step, the B will move it back by one step. You can use this to adjust the sequence to an external trigger without having to restart or for more experimental purposes.

5.4   Mode and Range

5.4.1   Mode

The mode switch defines weather the arpeggio is played upwards, downwards or both alternating. There is a fourth Random Mode that can be selected by the Range switch (see below)

5.4.2   Range

Set the range switch to 1 or 2 to play the sequence over a range of one or two octaves. In two octave mode notes that would extend the range of the keyboard are being folded back into the keyboards range.
Set the range switch to 3 to enter random mode. In this mode you can use the mode switch to select different random modes as follows:
UP: Normal random mode
DOWN: Non repeating random mode (two consecutive notes will never be the same)
UP & DOWN: Forward/Backward random (the sequence will randomly advance or go back one step)

5.5   Playing a previously saved sequence

To switch directly into Powerarp hold the KEY TRANSPOSE button, switch on the arp using the arp ON/OFF switch (same as recording a sequence). Now without recording a sequence press the KEY transpose button again. The Juno-66 is now in Powerarp mode with the previously

used sequence.

6 Custom tuning, scales and detuning

...more about this later...

7 Midi

7.1 Midi in

Depending on the setting in the see config menu the Juno-66 receives midi on channel 1-16 or an all channels (omni).
It reacts to midi notes 36 - 97

7.2 Midi out

The Juno-66 has two separate midi out modes and sends both on two different midi channels simultaneously. You can configure the channel numbers in the config menu or turn the channels off.
Midi notes 36 - 97 are being sent.

7.2.1 Midi out as played

On the as-played channel only the key presses on the Juno keyboard are sent. If you record this channel and send it back to the Juno-66, the synth will sound exactly the same as when you played it.

This is useful for using the Juno as a midi keyboard. In this mode sustain pedal events will be sent as "sustain" midi messages.

7.2.2 Midi out as sounds

On the as-sounds channel instead of the key presses and releases, midi is sent the way it actually sounds. In this mode the Juno-66 will output the arpeggiator, Powerarp, chord memory, Polychord and Monophonic modes including retrigger information. Sustain events will not be sent as midi massages but rather simulated with note on and off events.

When Mono B mode is selected the next note on event will be sent before the note off event. By most monophonic synths this can be interpreted as a 'glide's command.

7.3 Arpeggiator and Sample and Hold Trigger

The Arp and Sample and Hold clocks can be selected to trigger by the internal arp or midi. (see config menu). There are two midi trigger modes. when 'midi note' is selected as the trigger input, the trigger is midi note 0 (for the Arp) and midi note 1 (for the Sample and Hold)

When 'midi clock' is selected, the Arp and Sample and Hold will trigger in sync to the received midi clock. You can choose between a number of dividers for the midi clock to achieve various clock frequencies by sending midi controller messages (see midi controller chart). The table below shows the controller values and the resulting frequency in bars. You can also set the dividers in the config menu.

Ctrl val	0-7	8-15	16-23	24-31	32-39	40-47	48-55	56-63
Bars	2.5	2	1.5	1	$\frac{3}{4}$	1T	$\frac{1}{2}$	$\frac{3}{8}$
Ctrl val	64-71	72-79	80-87	88-95	96-103	104-111	112-119	120-127
Bars	$\frac{1}{2}T$	$\frac{1}{4}$	$\frac{3}{16}$	$\frac{1}{4}T$	$\frac{1}{8}$	$\frac{1}{8}T$	$\frac{1}{16}$	$\frac{1}{32}$

Table 1: Midi controller settings for arp and S/H LFO clock divider

7.4 Filter over midi

The Juno-66 features midi filter control. Controller massages received on controller number 17 will modulate the filter. The default value is 0.

The filter S/H LFO and the triangular LFO can also be controlled using midi.

7.5 Program change

The Juno-66 responds to program change commands and changes the play mode. It also sends program change commands when changing the play mode. The following table shows which program number corresponds with which play mode:

Program number	Play Mode
0	Poly
1	Duo
2	Mono
3	Chord
4	Polychord

Table 2: Midi program numbers and play modes

7.6 Pitch Bend

If the hardware is installed, the pitch bend can be controlled using midi by sending pitch bend commands. Use the Juno's amount sliders next to the bender to set the amount of pitch bend and/or filter modulation.

8 Triangular filter LFO

The Juno-66 features an additional LFO for the filter which outputs a triangular waveform.Its frequency can be adjusted from 0,12Hz - 8kHz using a fine and coarse control. The amount can also be adjusted. See the midi

controller chart for corresponding controller numbers.

9   S/H filter LFO

This is a build in sample and hold style LFO that controls the filter. A random value is created on every s/h clock event and sent to the filter. This simulates the effect of the sample and hold LFOs common in analog synthesizers, where a noise source is periodically sampled to get a new random value each time.

You can choose between three different clock sources by using the config menu. The internal arp clock, midi clock and midi trigger. The midi clocks divider can be adjusted in the config menu or via midi. When midi trigger is selected, the S/H will trigger when note C#-2 is played (second lowest midi note).

You can control the amount of this LFO by using the controller number shown in the midi controller chart or by using the config menu.

10 Config menu

In the config menu various parameters can be adjusted. For some parameters a value can be selected by using the lower 17 key of the keyboard, others can be selected with a single key press. Parameters that are also controlled using midi are saved when pressing any unused key in the konfig menu. You could for example set the portamento times using a midi controller and then save them in the config menu.
The figure below shows the parameters and how they are assigned to the keys. A larger version is provided at the end of this manual.

10.1 Enter and exit the config menu

To enter the config menu without having any key pressed on the keyboard, press the KEY TRANSPOSE button until its led starts blinking. To exit the config menu press it again.

10.2 Configure Midi Channels

Midi send an receive channels can be configured by pressing 'Midi In', 'Midi out as-sounds' and 'Midi out as-played' key and then selecting the channel with the lower keys. Midi in channel can be switched to 'omni', midi out channels can be turned off.

10.3 Portamento settings

To set times / speed for 'Slow' and 'Fast' settings, press the 'Speed fast' or 'Speed slow' key, then use the lower 17 keys to select a speed.
To switch between 'Constant time' and 'Constant speed' modes, press the coresponding buttons.

10.4 Detuning, Scales and Fatness

Press the Detuning and Fattnes keys and then use the lower 17 keys to set their parameters. The lowest key produces a very clean sound, (no fatness or detuning). Increasing the parameters will make the sound more alive, extreme parameter settings might sound detuned and experimental.
Press the scale key then use the associated lower keys to select a tuning or the 17th key to select a custom tuning.

10.5 Configure arp trigger

The arp trigger source can be selected by pressing the ARP 'Internal', 'Midi note','and midi clock' keys.
The midi clock divider for the arp can be adjusted by pressing the ARP 'Divider' key and then selecting the divider with the lower 17 keys. The table below shows which key belongs to which divider.

10.6   Configure S/H trigger

The S/H trigger source can be selected by pressing the S/H 'Internal', 'Midi note','and midi clock' keys.
The midi clock divider for the S/H can be adjusted by pressing the S/H 'Divider' key and then selecting the divider with the lower 17 keys. The table below shows which key belongs to which divider.

10.7   S/H LFO amount

The S/H LFO amount can be set by pressing the S/H amount key and then using the lower 17 keys to set the amount. The OFF key will switch the S/H lfo off.

10.8   Pitch bend calibration

To perform pitch bend calibration set the tune knob to the center position, make sure the pitch bend wheel is at center and then use midi to send midi pitch bend messages until the synth is in tune. In the config menu press 'pitch bend cal' to save the current setting as the new pitch bend center position.

10.9   Factory reset

To perform a factory reset press the highest note on the keyboard (C5). It will take a couple of seconds to complete. When the HOLD led starts blinking again, factory reset is finished.

Key	1	2	3	4	5	6	7	8
Bars	2.5	2	1.5	1	$\frac{3}{4}$	1T	$\frac{1}{2}$	$\frac{3}{8}$
Key	9	10	11	12	13	14	15	16
Bars	$\frac{1}{2}T$	$\frac{1}{4}$	$\frac{3}{16}$	$\frac{1}{4}T$	$\frac{1}{8}$	$\frac{1}{8}T$	$\frac{1}{16}$	$\frac{1}{32}$

Figure 4: Config mode keyboard assigment

11   Tips and tricks

11.1   Transferring a melody to Powerarp

You can transfer a melody from an external sequencer to the Juno-66 Powerap sequencer by going into Powerarp record mode and than sending the melody to theJuno-66 midi in channel.

11.2   Use of Powerap transpose and Polychord

You can use the combination of Powerarp transpose and Polychord in multiple creative ways. You could for example save the notes C to B in the first octave, some minor and major chords in the second and some sept chords in the third. After recording a Powerarp sequence in the first octave you can transpose to play either single notes, or chords. You can use the same

trick to 'transpose' between different melodies.

11.3   Copy a Polychord

If you want to move or copy a chord to a different key in Polychord mode, play it and then record it again.

12 Appendix

12.1 Midi controller chart

note: controller numbers in the chart are in the range of 0-127. If your midi controller displays controller numbers as 1-128 you have to add 1 to the numbers below.

Controller number	Usage	Range
16	Arp clock divider	* see table 1
17	Filter cutoff	0-127
18	S/H LFO amount	0-127
19	S/H LFO divider	0-127 *see table 1
21	CV2 (if installed)	0-127
22	CV3 (if installed)	0-127
23	Triangular lfo frequency coarse	0-127
24	Triangular lfo frequency fine	0-127
25	Triangular lfo amount	0-127
26	Detune amount	0-127
27	Fatness amount	0-127
28	Portamento speed fast	0-127
29	Portamento speed slow	0-127
64	Sustain	off:0-63,on:64-127
120	All Sound Off	-
123	All Notes Off	-

Table 3: Midi receive controller numbers chart

12.2 Troubleshooting

12.2.1 Midi in not working

Are you sending on the correct channel? Try all 16 channels or configure the midi in channel using the config menu.
The Juno-66 excepts midi input in a range of 6 octaves from C0 to C5. Check if you are sending in this range.

12.2.2 Midi loop back problems

If you experience, weired phasing effects, chord memory and arpeggiator not working as expected or similar problems you are most likely victim of midi loop back. A possible cause could be your DAW sending the received midi back to the output or your midi interface having a loop back function. To check if midi loop back is the cause disconnect the midi in (or out) connection and see if the problem disappears.

12.2.3 Midi filter control and S/H LFO not working

This is caused by either not sending the midi controller information on the midi in channel or the filter cable not soldered to the correct location on the Juno board.

12.3 Thanks

go to

Hannes Teichmann
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Alexandra Cielas

for everything else

Figure 5: Config menu options on keyboard