NES12ER

8-bit synthesizer

Operating manual

Contents

Chapter 1

User manual

1.1 Overview

1.2 The NESIZER

1.2.1 Sound channels

At the heart of the NESIZER is the NES APU chip, usually called 2A03 (or 2A07 if you use a chip from the PAL NES). The APU has five separate sound channels:

- **SQ1** and **SQ2**: These produce square waves with three selectable *duty cycles* (pulse widths).
- **TRI**: This channel produces triangular waves, but with a low 4 bit amplitude resolution. This results in the characteristic aliased NES bass and flute tones.
- **NOISE**: This channel produces various forms of noise. The noise can be white noise, or pitched noise if the *LOOP* mode is engaged.
- **DMC**: This channel can output 7-bit samples at a quick rate. The sampling rate is 16 kHz in the NESIZER .

1.2.2 Modulation

Because the 2A03 is put under much tighter control in the NESIZER than in a NES or Famicom console, the NESIZER features extensive modulation capabilities.

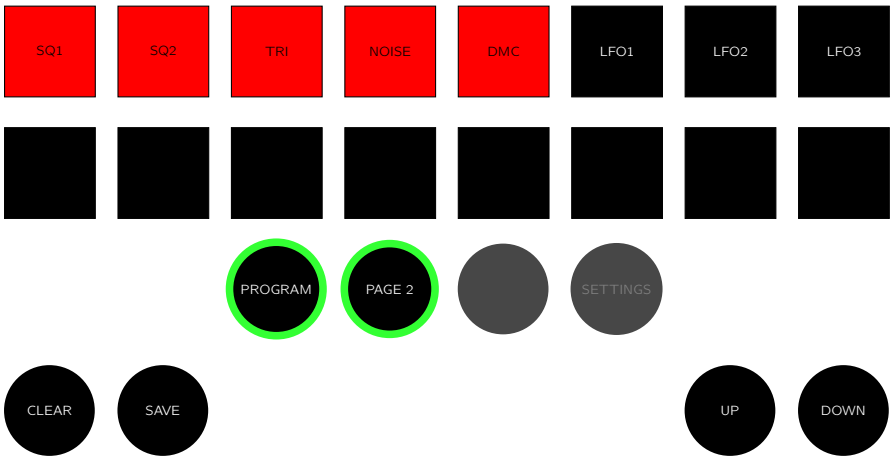
- Three separate low frequency oscillators **LFO1**, **LFO2**, **LFO3** with selectable waveforms (ramp up, ramp down, sine wave, triangle wave or square wave)
- Dedicated ADSR envelope generators for the square and noise channels

- Portamento / glide for the square and triangle channels

1.3 PROGRAM and PAGE 2 modes

This is the active mode when the NESIZER starts up. When in other modes, press the PROGRAM button to switch to this mode.

In the programming mode, the various parameters of the sound channels and LFOs can be changed. A set of channel and LFO settings are collectively known as a *patch*. The NESIZER can save patches to memory, and has room for 100 patches.



1.3.1 Loading patches

To load a patch, press either UP or DOWN. To go quickly up or down, press and hold the respective button. The current patch number is shown on the numeric display.

1.3.2 Saving patches

To save a patch, press SAVE. The button will start to blink to indicate that you can select where to store the new patch. Use UP and DOWN to select where to store the patch. Press SAVE again to store the patch at the selected location.

Note: When channel and LFO settings are changed, these are not saved until you press SAVE.

1.3.3 Enabling and disabling channels

To enable or disable a channel, press the corresponding channel button. When a channel is disabled, it does not produce sound when being triggered by the

sequencer or incoming MIDI data.

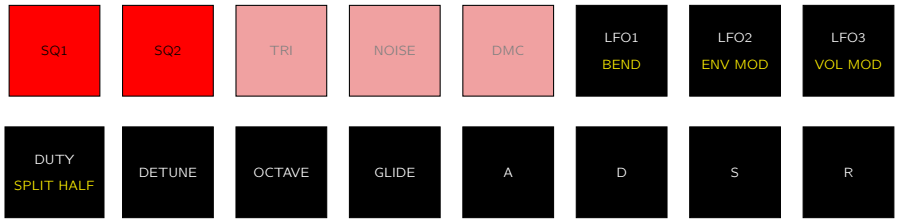
1.3.4 PAGE 2

By pressing PAGE 2, a second "page" og parameters become available. Some of them are channel parameters, and others are related to note assignment. When Page 2 is selected, the NESIZER is still in programming mode, so pressing UP or DOWN will change the current patch, and will discard any changes that haven't been saved. The parameters that are avilable in page 2 are shown in yellow color in the figures below.

1.3.5 Changing channel parameters

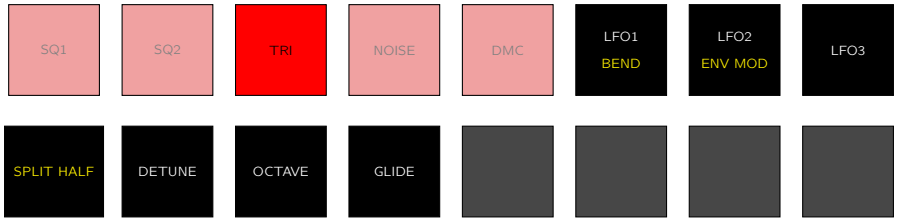
To change a channel's parameter, press and hold the desired channel's button, and the desired parameter button. For example, to change the attack of the square 1 channel, press SQ1 and A. The button LEDs will start to blink to indicate which channel parameter is being changed. Use the UP and DOWN buttons to change the parameter value. When you have the desired value, press SAVE.

Square channels



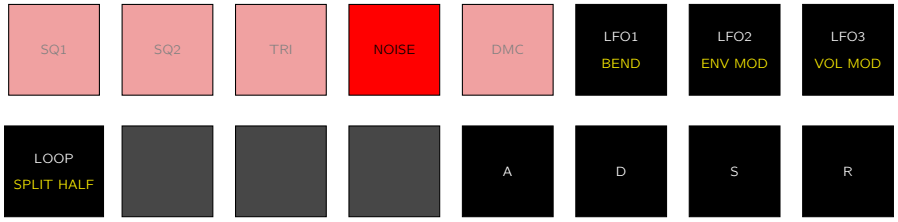
Parameter	Description	Range
LFO1	Intensity of modulation by LFO1	0 - 99
LFO2	Intensity of modulation by LFO2	0 - 99
LFO3	Intensity of modulation by LFO3	0 - 99
DUTY	Duty cycle	0 - 3
DETUNE	Detuning	-9 - 9
OCTAVE	Octave	-4 - 4
GLIDE	Portamento glide time	0 - 99
A	Volume envelope attack	0 - 99
D	Volume envelope decay	0 - 99
S	Volume envelope sustain	0 - 15
R	Volume envelope release	0 - 99
BEND (page 2)	Bend wheel intensity in semitones	0 - 24
ENV MOD (page 2)	Pitch envelope modulation amount	-9 - 9
VOL MOD (page 2)	Volume modulation by LFO3	0 - 16
SPLIT HALF (page 2)	See section 1.3.6	Lower - Upper

Triangle channel



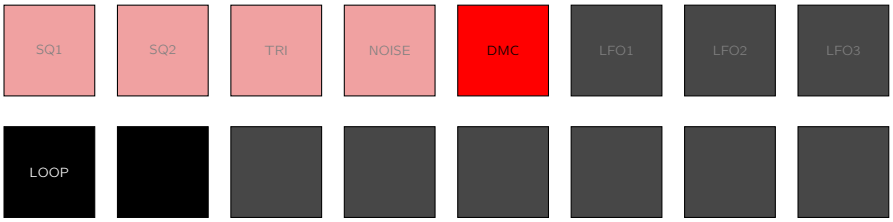
Parameter	Description	Range
LFO1	Intensity of modulation by LFO1	0 - 99
LFO2	Intensity of modulation by LFO2	0 - 99
LFO3	Intensity of modulation by LFO3	0 - 99
DETUNE	Detuning	-9 - 9
OCTAVE	Octave	-4 - 4
GLIDE	Portamento glide time	0 - 99
BEND (page 2)	Bend wheel intensity in semitones	0 - 24
ENV MOD (page 2)	Pitch envelope modulation (noise envelope)	-9 - 9
SPLIT HALF (page 2)	See section 1.3.6	Lower - Upper

Noise channel



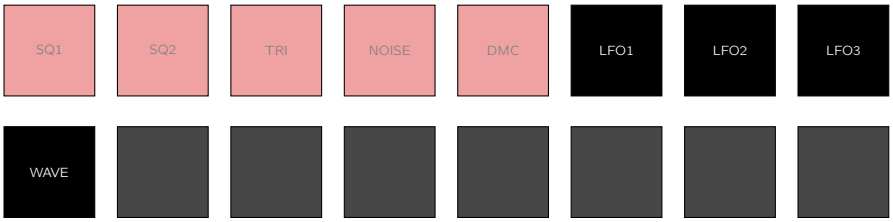
Parameter	Description	Range
LFO1	Intensity of modulation by LFO1	0 - 99
LFO2	Intensity of modulation by LFO2	0 - 99
LFO3	Intensity of modulation by LFO3	0 - 99
LOOP	Looped noise	on/off
A	Volume envelope attack	0 - 99
D	Volume envelope decay	0 - 99
S	Volume envelope sustain	0 - 15
R	Volume envelope release	0 - 99
BEND (page 2)	Bend wheel intensity (in steps)	0 - 15
ENV MOD (page 2)	Pitch envelope modulation amount	-9 - 9
VOL MOD (page 2)	Volume modulation by LFO3	0 - 16
SPLIT HALF (page 2)	See section 1.3.6	Lower - Upper

DMC channel



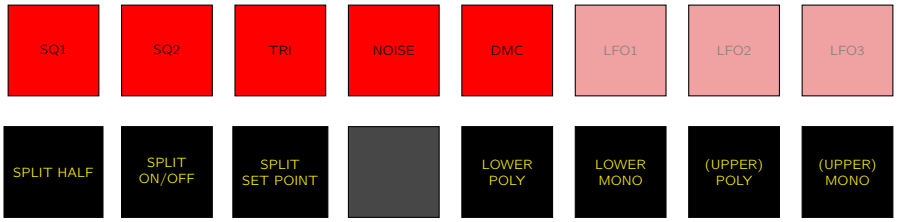
Parameter	Description	Range
LOOP	Play samples in loop	on/off

LFOs



Parameter	Description	Range
WAVE	LFO waveform	1 - sine 2 - ramp up 3 - ramp down 4 - square 5 - triangle

1.3.6 Note assignment



Monophonic and polyphonic modes

When several channels are sharing the same MIDI channel, notes can be assigned either monophonically or polyphonically. In **monophonic** mode, all channels will play the same incoming MIDI note, and any new note will cut off the previous. This mode is selected by pressing (UPPER) MONO. In **polyphonic** mode, the channels will be allocated in turn to each of the incoming MIDI notes. This mode is selected by pressing (UPPER) POLY.

Splitting the keyboard

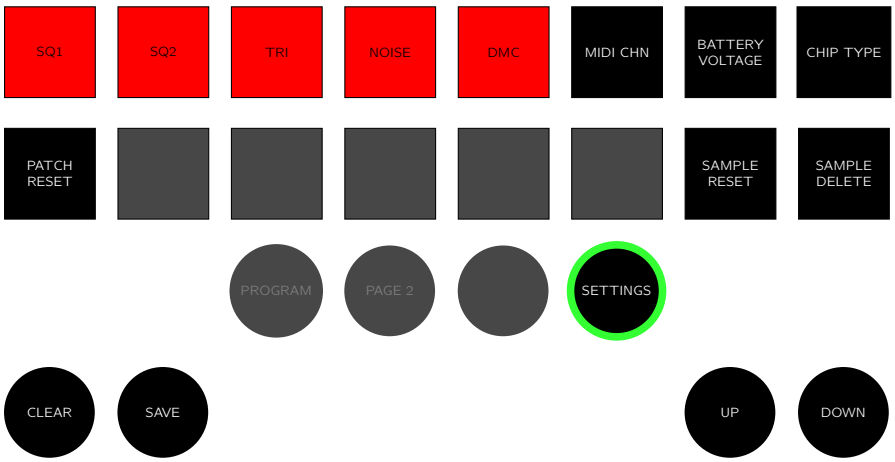
The MIDI keyboard[1] can be split into two sections, a *lower* and a *upper* section. To activate this split, press SPLIT ON/OFF. When the split is active, the *splitting point* sets the boundary between the lower and upper half. To change the splitting point, press SPLIT SET POINT, and select the note where you want the split. The notes are shown with a letter in the first half of the display, and the octave number in the second. A dot on the first display indicates a flat note. For instance, `E.5` would indicate the note E♭ in the fourth octave (as numbered in MIDI).

The channels can be assigned to either section by pressing and holding the corresponding channel button and then pressing SPLIT HALF. The sections are named on the display as `Lo` and `UP`, short for Lower and Upper, respectively. When a channel has been assigned to one of the halves, that channel will only play a note when that note is in the same half.

Several channels can be assigned to the same half of the keyboard, so there are separate monophonic and polypohnic settings for each half. Use LOWER POLY and LOWER MONO to select the assignment mode for the lower half. Similarly, use (UPPER) POLY and (UPPER) MONO to select the assignment mode for the upper half (these are the same buttons as used for assignment mode when split is off).

1.4 SETTINGS

When in the settings mode, various aspects of how the NESIZER operates can be changed. In this mode, the buttons have the following functions:



UP and DOWN can be used to select a sample number. Sample numbers that are occupied are marked with a dot on the display. A selected sample can be deleted by pressing DELETE.

[1] Not necessarily a physical keyboard, but more generally the range of MIDI notes.

1.4.1 MIDI

The NESIZER can be controlled externally using MIDI.

Assigning MIDI channels

Each of the five sound channels can be assigned to any of the 16 MIDI channels, and will then only respond to incoming messages on the selected channel.

To select a MIDI channel, enter the *SETTINGS* mode by pressing [SETTINGS]. Hold down [MIDI CHANNEL] and then press the desired channel's button. The LEDs will flash and you can select one of the 16 MIDI channels using the [UP] and [DOWN] buttons. If you select the value 0, the sound channel will not listen to any MIDI channel.

1.4.2 Checking the battery voltage

The NESIZER uses a battery for keeping the RAM storing the patches and samples alive when main power is disconnected. To check the battery's voltage, press and hold [BATTERY VOLTAGE]. As long as the button is pressed, the battery's voltage will be shown in the display. If the battery voltage is below 2.6 V, it should be replaced. On startup, the NESIZER will give a warning if the battery is 2.5 V or less. The display will flash bL (Battery Low) for a short duration.

1.4.3 Checking the 2A03 type

To see which 2A03 chip is being used, press the LFO3 button. One of the following numbers will show up:

- 12: Genuine RP2A03
- 15: 2A03 clone, e.g. 6527P
- 16: 2A07 (PAL version of 2A03)

1.4.4 Resetting patches

Press [PATCH RESET] to delete all patches. Every patch will be initialized to a basic patch with no channels enabled, square duty cycles set at 50% and full envelope sustain levels with no attack, decay or release.

1.4.5 Maintaining samples

When in SETTINGS mode, the up and down buttons are used to select DMC samples. A dot appearing on the display indicates that the selected sample location

is occupied. When an occupied sample is selected, it can be deleted by pressing SAMPLE DELETE. All samples can be erased by pressing SAMPLE RESET.