

# **GrooveStep**

**digital music studio**

**Release 1.0 (12/24/2008)**

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## What is GrooveStep?

GrooveStep is a portable sample based step sequencer and that allows people to write music anywhere with the Nintendo DS. GrooveStep is not a game, but it is an application for writing music.

To get the most out of GrooveStep, you should be familiar and understand the following concepts: Nintendo DS homebrew hardware, step sequencing, sample editing, LFOs, ADSR envelopes.

This manual assumes you have the proper hardware and know how to get GrooveStep up and running. Please consult the internet if you need help. If your hardware doesn't support DLDI auto-patching, you will have to do it manually.

## GrooveStep Features

- Easy to use step sequencer with up to 4 Groove Sliders per step
- 16 monophonic tracks with up to 2 sounds per track with ADSR envelopes and LFOs
- 16 variable length patterns up to 64 steps long
- 16 channel mixer with volume, mute and solo control
- Song arranger can chain up to 255 patterns each with individual settings
- WAV file support with preview in file browser with up to 2MB of sample RAM
- XY PAD real time performance interface

### PLEASE NOTE:

The GrooveStep timing isn't 100% perfect, but good enough for hobby use. A future update may address this issue.

## Terminology

**Sound Bank** – this means a sub-directory within the Banks directory, which contains sounds.

## Support

There is a private google group set up for GrooveStep. To join please visit <http://groups.google.com/group/groovestep>

## Installing GrooveStep

Copy the GrooveStep.nds (or .sc.nds for SuperCard users) file and GrooveStep directory (from the DS folder in the archive) to the root of your flash card.

The file structure should look like this:

```
GrooveStep.nds <- application
GrooveStep\ <- main GrooveStep directory
    |-Banks\ <- holds sub dirs containing sounds (.raw and .ton)
    |     |-Demo\ <- demo bank for demo song
    |- Songs\ <- where all songs are stored (.grv)
```

## GrooveStep File Types

.grv - GrooveStep song file format

.wav - WAV sample file format (mono, 44100Hz)

.ton - tone file format (generated by the tonegen application)

## File System Limitations

ALL DIRECTORY AND FILES NAMES SHOULD BE NO LONGER THAN 30 CHARACTERS (not including the file extension). There should be no more than 256 files of any one type in a directory. So max 256 songs in the song dir, 256 sound banks sub directories, 256 .ton and 256 .raw files in a single sound bank directory.

## Sound File Format Technical Details

There are currently 2 types of audio files supported in GrooveStep: **Samples** and **Tones**. All audio is 16 bit. If you want to get a lo-fi sound like 8 bit, just render your samples as 8 bit, and resample them back up to 16 bit.

### SAMPLES

Samples are just regular WAV format sound samples.

#### SAMPLE FORMAT:

WAV file format, MONO, 44,100 Hz, 16-bit.

### TONES

Tones are specially generated sample files created with the ToneGen program. ToneGen takes a RAW (44,100 Hz, 16-bit signed, little endian (intel) byte order) sound file of a very high resolution single cycle oscillation and outputs a proper formatted file that can be used by GrooveStep.

#### TONE FORMAT:

RAW file format, variable kHz, 16 bit signed, little endian (intel) byte order, 12793 samples = 25586 bytes

## ToneGen

GrooveStep comes with a Windows C# command line application called ToneGen which is used to generate .ton files that can be used with GrooveStep. You will need to install the Microsoft .NET framework if you don't have it. Also, the source is included so anyone can mess with the code and make their own version or port to other platforms.

There is a sample batch file called *buildtones.bat* which generates .ton files from some sample tones. If you open up the .raw and generated .ton files in a sound editor, you can get an idea of how the tone file is built from the original raw sound.

Tones are intended to be single cycle oscillations, but there is nothing stopping you from trying different types of files to get different results. You can even reverse the data in a tone file to get some glitchy sounding results, but that has to be done outside of GrooveStep.

# Getting Started

## Checking Out The Demo Song

1. If you are not at the Song screen then go there. (L-Button to bring up screen selection)
2. Click the LOAD button and select DemoSong from the list and hit the SELECT button.
3. Go to the Arranger screen.
4. Click on the SONG button.
5. Click on the PLAY button.

Tracks 1-3 use samples while tracks 4 and 5 use tones.

## Adding Your Own Sounds

The process to get your own sounds into GrooveStep is fairly simple.

1. Gather your .raw and .ton sound files.
2. Create a sound bank sound directory inside the “Banks” directory.
3. Copy your sound files inside your new directory.

## Creating A New Song

The first step of creating a new song, is selecting the sound bank for that song. All sounds for a song must be loaded from the same sound bank.

1. Go to the Song screen.
2. Click on the grey bar under “BANK NAME:”, select a sound bank from the list and click the SELECT button.
3. Go to the Track Editor screen.
4. Go to the SOUNDS->SND1(or SND2)->SOURCE tab and click on the LOAD button.
5. Select a sound from the list and click the SELECT button.

Now you can play the sound from the keyboard at the bottom of the screen and tweak the sound parameters. When you are happy with the results, go to the Pattern screen and start inputting a pattern for the track.

## Controls

L TRIGGER - bring up pop-up screen (screen navigation, pattern/song options, copy/paste, options screen) [this mapping can now be changed in the settings screen]

SELECT – show/hide the settings screen

START - start/stop playback

DPAD - change/edit selected slider control when a control is highlighted, left/right change current pattern on PATTERN SCREEN if no control is highlighted

TOUCHSCREEN - everything else QUICKSTART

At the top of the bottom screen (pattern editor screen), there is a row of circles. Those represent the tracks. The first 5 circles have sounds assigned to them. Tap them to hear the sound playback. If there are 2 sounds mapped to that track, playback will toggle between the sounds. The top screen (overview screen) displays the names of the sounds and highlights the current selected sound.

Start playing with the sliders to change the volume (unless you select a different Groove Slider Tab). If you want to change patterns, first make sure no slider is selected. When a slider is selected, it will be highlighted with a yellow box. To deselect it, just tap the L TRIGGER to make the POP-UP SCREEN appear momentarily.

## **The GrooveStep Screens**

## OVERVIEW SCREEN (top screen)

01: 909 Kick	09: (none)
02: (none)	10: (none)
03: 909 Clap	11: (none)
04: 909 C-Hat	12: (none)
05: 909 D-Hat	13: (none)
06: saw	14: (none)
07: sine mul	15: (none)
08: sine tri	16: (none)
09: (none)	
10: (none)	
11: (none)	
12: (none)	
13: (none)	
14: (none)	
15: (none)	
16: (none)	
CURRENT TRACK: 1 SOUND: 1	
SOUND NAME: 909 Kick	
PATTERN: 1/16	
TEMPO: 120	
PLAY SPEED: 0x LAST STEP: 16	

## SETTINGS SCREEN



This screen contains some global settings that can be saved.

POPUP KEY – tap to toggle which key is mapped to bring up the popup menu

POPUP TOGGLE – OFF – will only display POPUP menu when POPUP KEY is held down, ON – POPUP KEY will toggle the display of the POPUP MENU

PREVIEW SOUND – enable/disable WAV sample preview in the sample browser

XY PAD LINKED – ON – both x and y axes are mapped to the same track, OFF – y axes track is selected at the track selection buttons at the bottom of the screen

SAVE – save the settings

## SONG SCREEN

SONG NAME:			
Demo Song			
ARTIST NAME:			
GrooveStep			
BANK NAME:			
DEMO			
FILE NAME:			
DEMOSONG			
TEMPO: 120			
-1	+1	-10	+10
NEW		LOAD	SAVE

This screen contains the song info in addition being to the place where you load, save and initialize new songs.

SONG NAME – click on the gray bar below “SONG NAME:” to enter the text entry screen for this value

ARTIST NAME – click on the gray bar below “ARTIST NAME:” to enter the text entry screen for this value

BANK NAME – click on the gray bar below “BANK NAME:” to enter the sound bank directory selection screen.

FILE NAME - display of the file name

TEMPO – display

TEMPO CONTROLS – to adjust song tempo

NEW – clears out the current song in memory and initialized everything to a default state.

LOAD – open the file selection screen to select a song to load

SAVE – open the text entry screen to edit the song file name to save.

## FILE SELECT SCREEN



The file select screen is used to select the file/directory for various operations

CANCEL – cancels the request

SELECT – confirms the request with the selected item

## TEXT ENTRY SCREEN



The text entry screen is used at various times to allow entry of text data for saving/naming operations

## POP-UP SCREEN (screen navigation)



Holding down the L TRIGGER (or another key mapped in the SETTINGS SCREEN) will bring up the POP-UP screen which has 4 tabs:

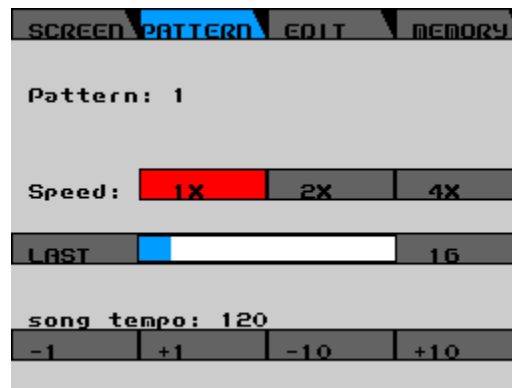
SCREEN - allows for quick screen navigation

PATTERN - pattern/song settings

EDIT - copy/paste options

MEMORY – displays the current memory information

## POP-UP SCREEN (pattern settings / song tempo)



This screen gives quick access to pattern settings and the song tempo

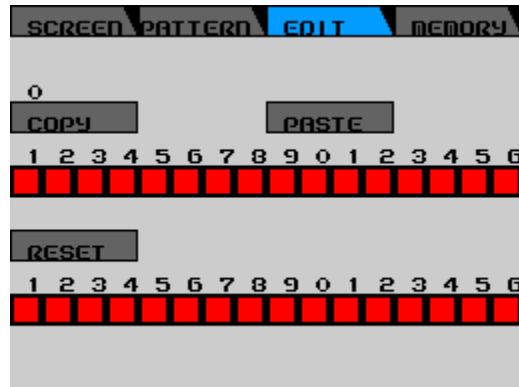
PATTERN - displays the current pattern number (1-16)

SPEED - controls the speed playback for the pattern (1x, 2x, 4x)

LAST - controls the last step for the pattern (1-64)

SONG TEMPO - controls the song tempo

## POP-UP SCREEN (edit - pattern copy/paste)



This screen gives quick access to pattern copy/paste controls

COPY - will set the current pattern as the source for a copy/paste function

PASTE - will perform the paste into the current pattern

TRACK NUMBERS - can be used to filter which tracks are copied from the source

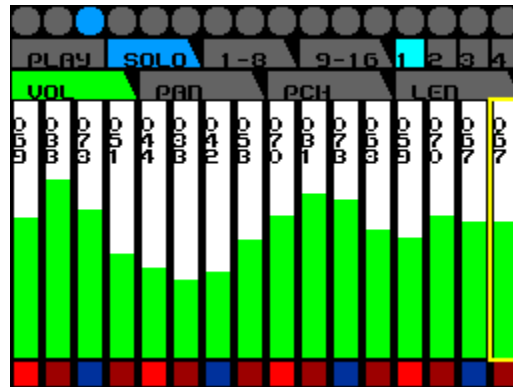
RESET – will reset pattern step data for all tracks selected below the button

## POP-UP SCREEN (memory)

SCREEN PATTERN EDIT		MEMORY
01:	51100:0	09: 0:219072
	0:219072	0:325668
02:	83968:51100	10: 0:325668
	0:219072	0:325668
03:	0:325668	11: 0:325668
	0:325668	0:325668
04:	0:325668	12: 0:325668
	0:325668	0:325668
05:	0:325668	13: 0:325668
	0:325668	0:325668
06:	0:325668	14: 0:325668
	0:325668	0:325668
07:	0:325668	15: 0:325668
	0:325668	0:325668
08:	0:325668	16: 0:325668
	0:325668	0:325668
SAMP RAM: 2748488		
USED RAM: 325668		
FREE RAM: 2422820		
SongSize: 77604		

The memory screen reports the memory usage of all samples loaded in memory. You can also get a summary of total memory usage and how much is still available at the bottom.

## PATTERN SCREEN (solo track view)



This is the main pattern editing screen

**TRACK BUTTONS** - top row selects the track/sound to edit - red = sound one, blue = sound two

**PLAY BUTTON** - starts/stop playback

**SOLO BUTTON** - sets the edit mode to solo track view with slider editor

**1-8/9-16 BUTTONS** - sets the edit mode to multi track view with step buttons (see next screen)

**PAGE BUTTONS** - sets the page for the pattern (1-4)

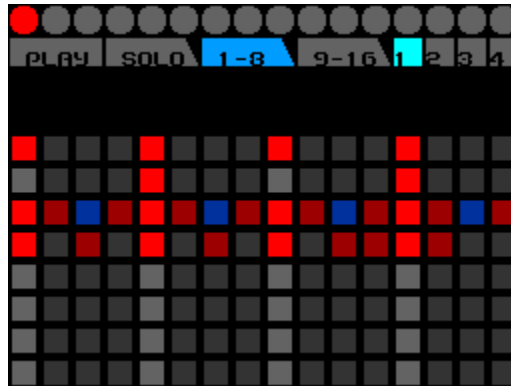
**GROOVE SLIDER TABS** - selects which of the 4 sliders to currently view/edit

**GROOVE SLIDERS** - actual step sliders

**GROOVE STEP BUTTONS** - selects which sound (red, blue) to play at any given step

\*\*\*The GrooveStep concept: each step in the sequencer can have up to 4 "groove" sliders associated with it. The groove sliders are selected on the TRACK SCREEN. This allows for varied step sequences, which can have different volume, pan, etc., settings for each step.

## PATTERN SCREEN (8 track view)



This is the multi track view of the pattern screen

TRACK BUTTONS - top row selects the track/sound to edit - red = sound one, blue = sound two

PLAY BUTTON - starts/stop playback

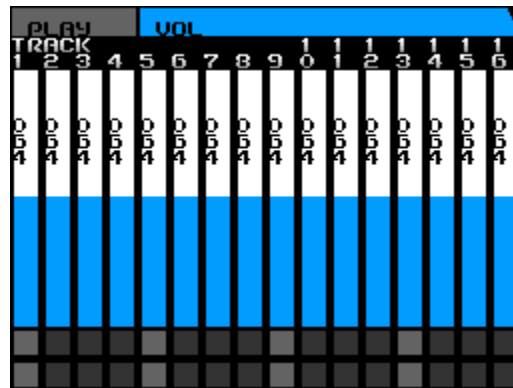
SOLO BUTTON - sets the edit mode to solo track view with slider editor

1-8/9-16 BUTTONS - sets the edit mode to multi track view with step buttons)

PAGE BUTTONS - sets the page for the pattern (1-4)

GROOVE STEP BUTTONS - selects which sound (red, blue) to play at any given step

## MIXER SCREEN



This screen allows for fine tuning of the volume settings for the tracks

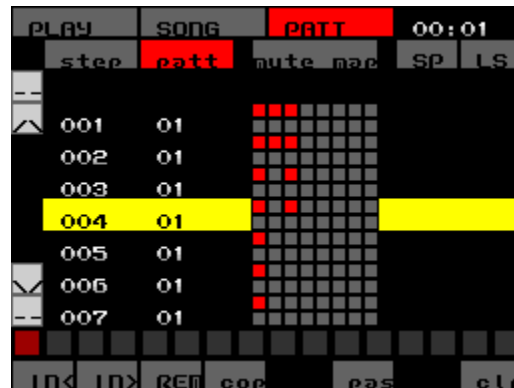
PLAY BUTTON - starts/stop playback

VOLUME SLIDERS - sets the volume for the track

MUTE BUTTONS - mutes the current track

SOLO BUTTONS - solos the current track

## ARRANGER SCREEN



This is the screen where patterns can be arranged into a song

PLAY BUTTON - starts/stop playback

SONG BUTTON - sets the playback mode to song

PATT BUTTON - sets the playback mode to pattern

TIME DISPLAY - displays the current play time

PATT EDIT BUTTON - sets the edit mode to PATTERN

MUTE MAP BUTTON - sets the edit mode to MUTE MAP

SP BUTTON - sets the edit mode to SPEED OVERRIDE

LS BUTTON - sets the edit mode to LAST STEP OVERRIDE

TOP ARRANGEMENT BUTTON - jumps to the top of the ARRANGEMENT

UP ARROW BUTTON - moves one step up in the ARRANGEMENT

SCRUB BAR - scrub through the ARRANGEMENT

DOWN ARROW BUTTON - moves one step down in the ARRANGEMENT

BOTTOM ARRANGEMENT BUTTON - jumps to the bottom fo the ARRANGEMENT

EDITOR ROW [4 modes]:

PATTERN - sets the pattern for the current arrangmennt step

MUTE MAP - edits the mute map for the current arrangement step

SPEED OVERRIDE - sets the play back speed for the current arrangement step

LAST STEP OVERRIDE - sets the pattern last step of the current arrangement step

INSERT BEFORE BUTTON - inserts a new arrangment step before the current position

INSERT AFTER BUTTON - inserts a new arrangement step after the current position

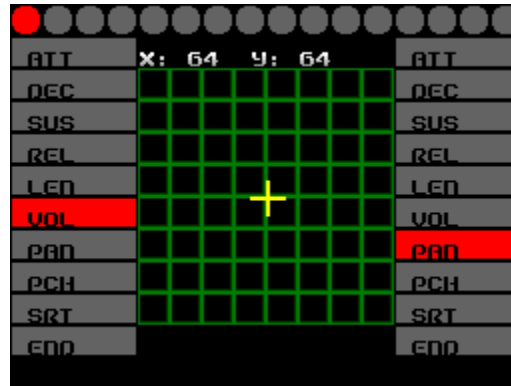
REMOVE - remove the current selected arrangement step

COPY - copy the current step settings

PASTE - paste the current step settings

CLEAR - clear the current step setting

## XY PAD SCREEN - live performance screen



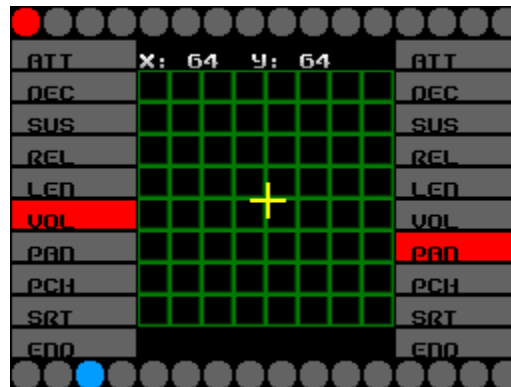
This screen allows for realtime parameter override during playback

TRACK BUTTONS - top row selects the track/sound to edit - red = sound one, blue = sound two

LEFT SIDE PARAM SELECTION (X COORD) - select which param the X coord represents

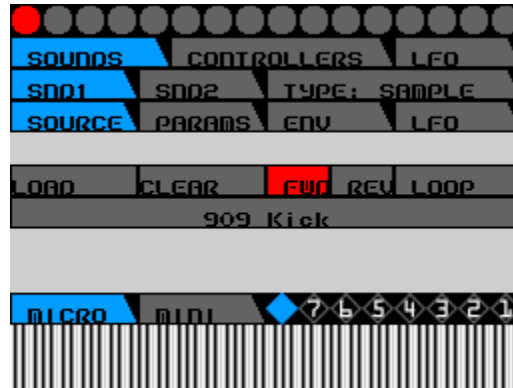
RIGHT SIDE PARAM SELECTION (Y COORD) - select which param the Y coord represents

XY PAD - move the stylus on this pad to change the value in realtime



TRACK BUTTONS (bottom row) – if the XY PAD LINKED option on the settings screen is set to off, these buttons will be available to select the Y axis parameter independently of the X axis.

## TRACK SCREEN OVERVIEW



This is the screen where sounds are selected/loaded and their parameters are set  
TRACK BUTTONS - top row selects the track/sound to edit - red = sound one, blue = sound two

The 3 main tabs are:

SOUNDS - this tab has all the parameters for the sounds for each track

CONTROLLERS - this is where you set which parameters the GrooveSliders are mapped to in the pattern editor LFOS - each TRACK HAS 2 LFOS and each SOUND can use both LFOS as modulation sources

There is also a dual mode keyboard at the bottom for auditioning sounds.

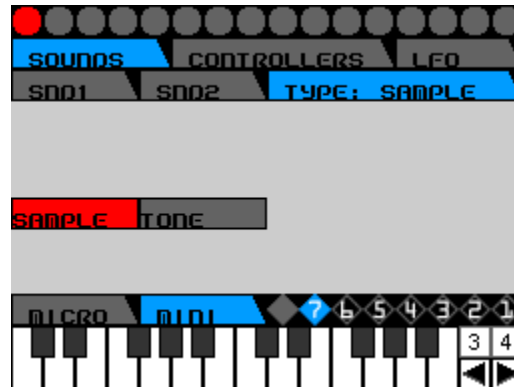
MICRO MODE - each 2 pixels represent 1 note so you get access to the full 128 notes (just like MIDI!)

MINI MODE - a 2 octave keyboard with octave UP/DOWN buttons

RANGE BUTTONS (\*, 7, 6, 5... 1) - These buttons select how many octaves are mapped across the 128 KEYS - ONLY AVAILABLE FOR SAMPLES (and NOT TONES).

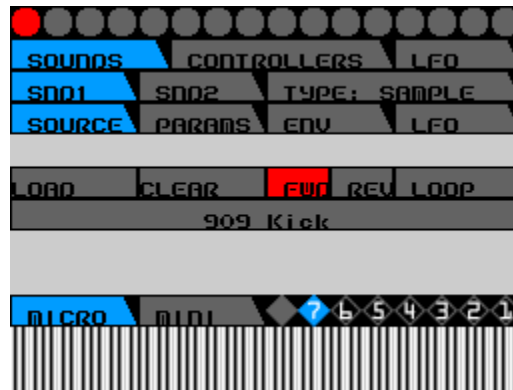
\* is the standard mapping (10.666667 octaves), the 1-7 values are useful for sounds where you need more pitch control

## TRACK SOUND TYPE



There are currently 2 types of sounds supported: SAMPLES and TONES  
SAMPLES are normal samples and will be in a 44100kHz 16bit RAW format  
TONES are specially processed single cycle oscillator samples. The converter application and source code will be provided later so people can make their own TONES  
Switching modes will clear out any sounds previously loaded in the track and reset parameters

## TRACK SOUND SOURCE



LOAD - load a sound

CLEAR - clear the sound

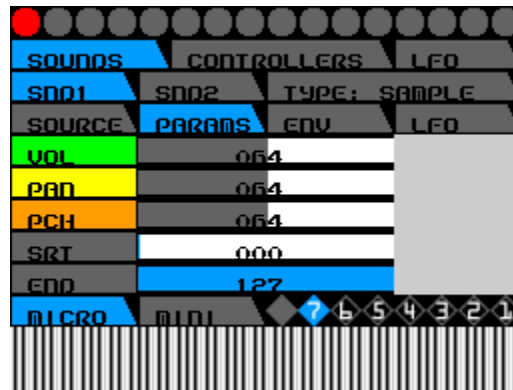
SAMPLE ONLY CONTROLS:

FWD - set the play direction to forward

REV - set the play direction to reverse

LOOP - toggle loop mode for the sample

## TRACK SOUND PARAMS



VOL - controls the sound volume

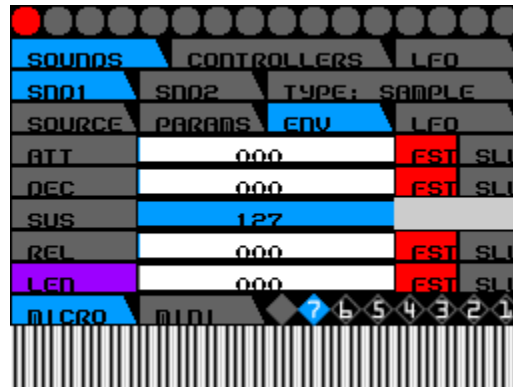
PAN - controls the sound pan (stereo)

PCH - controls the sound pitch

SRT - trims the sound length from the start of the sample (SAMPLE ONLY)

END - trims the sound length from the end of the sample (SAMPLE ONLY)

## TRACK SOUND ENV (ENVELOPE)



SOUNDS	CONTROLLERS	LEO
SND1	SND2	TYPE: SAMPLE
SOURCE	PARAMS	ENV
ATT	000	FST SLW
DEC	000	FST SLW
SUS	127	
REL	000	FST SLW
LEN	000	FST SLW
MICRO	MIDI	7 6 5 4 3 2 1

ATT - attack time

DEC - decay time

SUS - sustain level

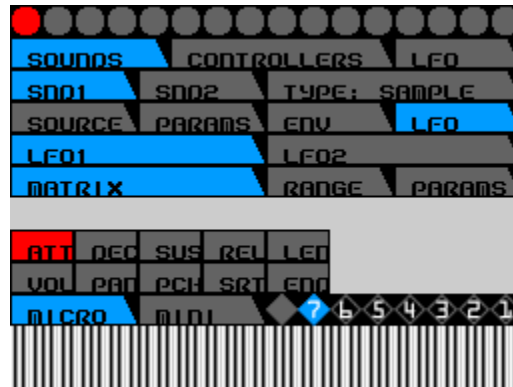
REL - release time

LEN - note len (leave at 0 to play entire SAMPLE)

FST - set the time mode to FAST (10x the slow speed)

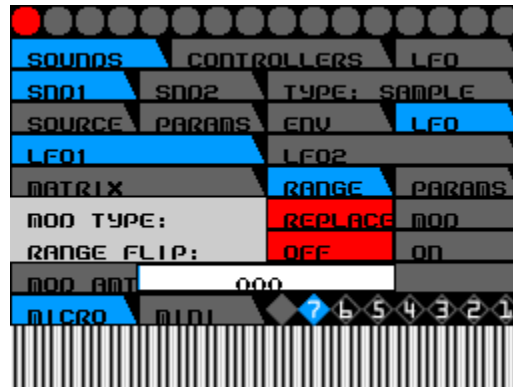
SLW - set the time mode to SLOW (1/10th the fast speed)

## TRACK SOUND LFO MATRIX



Select which parameter the LFO is mapped to

## TRACK SOUND LFO RANGE



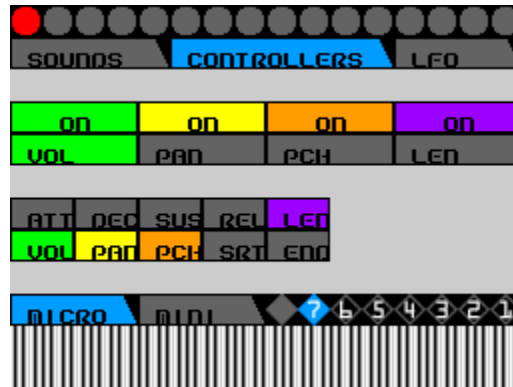
MOD TYPE - REPLACE overwrites the parameter value, MOD modulates the parameter  
RANGE FLIP - inverts the LFO value MOD AMOUNT - how much will the LFO affect  
the parameter (0-127)

## TRACK SOUND LFO PARAMS

SOUNDS	CONTROLLERS	LFO	
SND1	SND2	TYPE: SAMPLE	
SOURCE	PARAMS	ENV	LFO
VOL	064		
PAM	064		
PCH	064		
SRT	000		
EDD	127		
MICRO	MIDI	7 6 5 4 3 2 1	

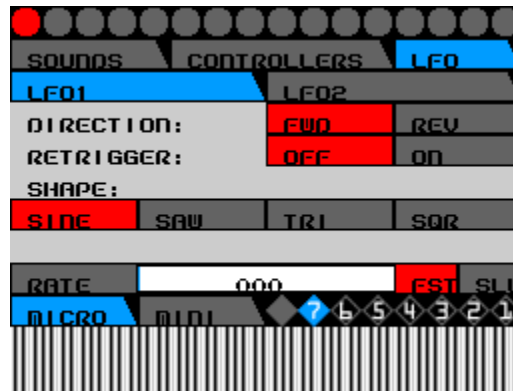
FREQ DROPOUT - only works for the PCH modulation, but it will create a "broken" LFO that will allow the frequency to drop to 0. Originally a coding error, but it created a nice low-fi sound.

## TRACK CONTROLLERS



You can configure what parameter the 4 GrooveSliders are mapped to and even turn them on/off

## TRACK LFO



Each track has 2 LFOs that can be used to modulate sound parameters to give them more life.

**DIRECTION** - which direction the LFO plays (same behavior as inverting)

**RETRIGGER** - retrigger the LFO with every note on

**SHAPE** - select the shape of the LFO

**RATE** - 0-127 where 0 is off. **FST/SLW** - select FAST or SLOW rates.

## **Acknowledgements**

GrooveStep was developed using devkitPro, PALib, no\$gba and iDeaS.

Special thanks to CEIsar and SirGnip for the bug reports and feedback.