EBT - ESPboy tracker
User Manual

v1.0 20.10.2023 by shiru8bit

About

EBT is a tiny, minimalistic, yet quite powerful chiptune-like music editor with a tracker interface, originally developed for the ESPboy portable DIY handheld platform.

The source code is portable, so it may be available on other platforms as well. Currently it features an SDL port, so it can run on a regular desktop PC as well, sharing the same data format, so the song and instrument files are easily transferable between the devices.

Installation

This section explains how to install the EBT into the ESPboy device.

Before starting to use EBT on your ESPboy you need to upload this software to the device somehow. There are a few methods to do this.

You can get the EBT source code, Arduino IDE, all required libraries (they’re installed via IDE library manager), connect your ESPboy to the PC via USB cable, and upload the sketch.

You can download a pre-built version of the EBT via the on-device AppStore.

Warning! When you install or update software via cable or AppStore, ESPboy’s internal Flash memory may get cleared, losing all saved songs without a possibility to restore them! Don’t forget to use WIFI AP and WiFi connection to backup your data!

Normally an update won’t clear the files, and a brief installation of another software (say, a game) that does not use the Flash memory to store files, should not clear it either. However, in case of a doubt always consider a backup!

Features

Features may vary depending on a target device, but general outline for the ESPboy is as follows:

- Software chiptune-like sound synthesis engine
- 4 channels polyphony
- Speed control with an automatic shuffle
- Up to 128 order list positions
- Up to 128 instruments controlled via simple set of parameters
    - 32 waveforms
    - 4 volume levels
    - Slide up/down and modulation (vibrato) effects
    - Fixed pitch option
- Up to 160 single-channel patterns
- Up to 32 rows per pattern
- Up to 2 effects per a pattern row
    - Arpeggio with variable speed
    - Slides up and down
    - Portamento (slide to a note)
    - Waveform and phase control
    - Speed control
- Stereo support
- A range of sound output devices supported

The number of entities above is selected to fit everything into the ESP8266 RAM. SDL build has all the numbers (but pattern lengths, for compatibility) maximized to 255, just in case.

Song structure

EBT uses the traditional music tracker song structure. Here is a short overview.

Channels

The tracker features four sound channels, so up to four notes can be played simultaneously. The way the notes are sounding, i.e. their timbre, is defined by using Instruments. The sequence of notes they're playing is defined with Patterns and Order list.

Patterns

A pattern is a sequence of notes in a single channel pattern that can be up to 32 rows long. It may contain notes, instrument changes, and special effects that alter the way the sound is produced. Notes and instrument numbers can be entered into a pattern to play a short music phrase or rhythmic section.

Order list

Order list defines the pattern combinations and the order in which they'll be playing.

It also allows transposing pattern entries, so one pattern can be reused to play the same sequence in a different key.

Patterns in the same order position can have different lengths. The order position will play until the longest pattern ends. If there are shorter patterns at the same position, they will either play and stop, or wrap around, controlled via the CYC option of a pattern.

Instruments

Instruments have a number of simple settings to define the way the sound in a channel is produced. They can use a waveform selected from a number of presets, pitch slide, modulation, and other effects.

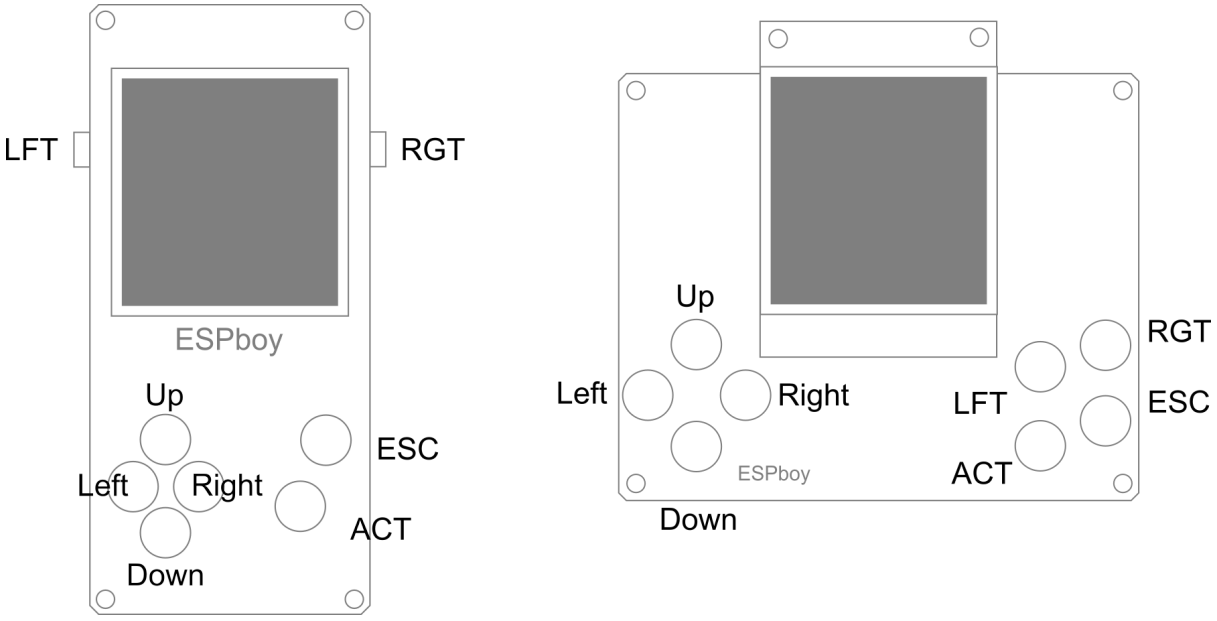
There is the fix pitch option that will force the instrument to always play the same selected note, regardless of what is entered in the pattern and the transposition set in the order list. This comes handy for percussion instruments, as they can always keep the same pitch.

Interface

EBT user interface has been designed along the lines of the popular Game Boy tracker LSDJ. It mimics the overall control scheme with a directional pad and four control buttons, although in no way meant to replicate it, or the functionality, in full.

ESPboy features eight control buttons: a direction pad and four action buttons. Two of them are primary action buttons called ACT and ESC, acting as a confirmation and cancellation button respectively, Two extra buttons called LFT and RGT used for auxiliary actions.

The button layouts are different between various ESPboy versions, and normally are located like this:



The buttons have a function assigned to each of those that is more or less consistent all across the interface. A quick overview of these functions follows. Mode-specific use is explained in detail in corresponding sections below.

In the SDL build the buttons are mapped as follows:

- Up/Down/Left/Right are the cursor keys
- ACT is Z
- ESC is X
- LFT is A
- RGT is S

ACT: item selection, editing values and parameters

The ACT button is generally used to confirm an item selection, or to edit values and parameters.

Most values and parameters can be changed by holding down the ACT button and pressing Up/Down/Left/Right.

Depending on a particular parameter to be changed, the Up/Down change the value in a greater step, most often it is an octave for notes, or 16 for hexadecimal values.

Pressing the ESC button while holding down the ACT button reverts a value to the default.

ESC: cancel, sub-menus, entry switch, increase step

The ESC button has a few functions:

- A singular press usually cancels a selection
- Holding it down while moving the cursor Up/Down increases the step.
- Holding it down and pressing Left/Right switches between order modes, pattern and instrument numbers, effects columns. This action is context-dependent.
- Double tapping ESC button switches between modes and menus on a single screen.

LFT: navigation and copy/paste

The LFT button calls up the NAVI screen (see below) where you can switch between the screens and use the context dependent Copy/Paste functions (also see below).

RGT: playing

The RGT button is used to control all sound playing functions. Depending on the context, i.e. on which screen is currently active, pressing or holding it the sound will start or stop playing:

- If the SONG screen is active, it plays the whole song from the beginning. It is also dubbed with the PLAY menu item. It works as a toggle, i.e. if a song is not playing, it'll start it, otherwise it'll stop it.
- If the ORD screen is active, it plays from the current order position. It also acts like a trigger.
- If the PTN screen is active, the current pattern will be playing while the button is held down. The playing will start from the current row.
- If the INST screen is active, a test note using the current instrument will be playing while the button is held down.

NAVI screen

This is the navigation screen where you can switch between the rest of the screens, i.e. different editing and configuration modes. It is displayed while the LFT button is held down. You can use Up/Down/Left/Right to quickly switch between the screens.

You can switch between four main screens:

- SONG: contains song settings, save and load. Usually get accessed by pressing Up.
- ORD: order list, accessed at any time by pressing Left.
- PTN: pattern editor, accessed at any time by pressing Right.
- INST: instrument editor. Usually get accessed by pressing Down.

There a couple more additional ones that can be accessed by pressing Up or Down a couple times:

- INFO: a quick help screen.
- CONF: editor configuration.

These screens are explained in detail in corresponding sections below.

Besides the navigation, the NAVI screen features Copy/Paste functions.

Copy and paste

Copy and Paste functions are accessible from the NAVI screen by pressing ACT or ESC buttons.

They're context dependent:

- If it is the INST screen, it will copy or paste the instrument entirely.
- If it is the ORD screen, it will copy a selection or paste a clipboard into the cursor position. Selection is done from the SEL item in the sub menu.
- If it is the PTN screen, it will copy or paste the entire pattern.

INFO screen

The info screen provides a short quick help on the interface and editor function, just as a small reminder. It also displays the version number and build date.

SONG screen

The SONG screen contains a number of actions and options that are applicable to the song project in general.

PLAY

This menu item plays the song from the beginning. It is also dubbed with the RGT button pressed on the SONG screen.

Selecting the item while the song is playing will stop it.

LOAD

This menu item calls up the File Selection dialog that shows up all files that are located in the ESPboy's internal Flash memory. You can store a handful of songs there and load them when they're needed.

A confirmation dialog will pop up before actual loading, to prevent you from accidentally loading a file over your unsaved project.

Warning! Uploading a different firmware, like a game, may erase the internal Flash contents! Don't forget to make backups via the WIFI AP and WiFI connection!

SAVE

This menu calls up the Filename Entry screen where you can give your song project a name and save it into the ESPboy's internal Flash memory.

The name gets remembered for the whole duration of a current session (until switching it off), and it is also picked up when you load a song, so you don't have to remember it.

If the file is already in the memory, an Overwrite prompt will pop up.

SP.EVEN, SP.ODD and SP.INTR

These menu items are used to control song tempo.

EBT uses a system that is similar to the usual deal with the chiptune tracker: the tempo is only defined in an integer number of 1/60 second units. The greater the speed value is, the slower the tempo.

In addition, there are two speeds that can be set to different values, and an interleave factor. It allows you to create a shuffle effect. For example, set one of the speeds to 6, another to 4, and set interleave factor to 2. This also may come handy to tweak up the speed a little bit beyond what is possible when both speeds set to the same value.

This setting is applied at the beginning of song playing. However, you can tweak it further up using the Fxx pattern effect.

CLR.SONG

This item clears the song data, which is Order list and patterns, but keeps existing instruments. It can be useful if you want to use all instruments from an existing song in a new one.

A confirmation dialog will pop up before actual clearing.

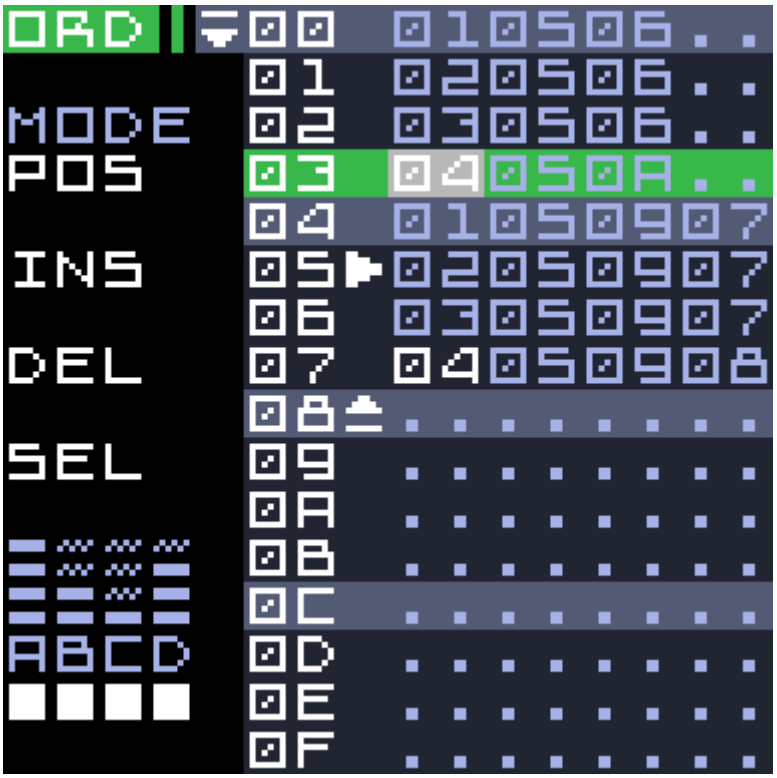
CLR.ALL

This item clears the whole song, including instrument data. It is useful when you want to begin a new project without turning off the device.

A confirmation dialog will pop up before actual clearing.

ORD screen

The ORD screen is where you can set up a sequence of patterns to be played in a particular order. Besides that, it allows you to put a transposition to each of the patterns, so the same patterns can be reused to play in a different key.



General editing

Press the ACT button on an empty field to enter the last used value there. Pressing the ACT button again on a just added field will set this position to the first pattern number that is not used anywhere in the order list yet. This is useful to quickly add new order positions.

Press the ACT button on a non-empty field to remember the value, to be added to an empty field later.

Press the ACT and ESC buttons simultaneously to clear a value in the current cursor position.

Hold down the ACT button and press Up/Down/Left/Right to change a value at the current cursor position.

Hold down the ESC button and press Up/Down to quickly move through the order.

Hold down the ESC button and press Left or Right to quickly switch between the pattern sequence and transposition modes.

Hold down the ESC button and hold down Left or Right for a short time to set the loop start/end position. This is needed to avoid accidental change. Left sets the loop start, Right sets the loop end.

Double tap the ACT button on a non-empty pattern field to quickly switch to the pattern editor with this pattern selected.

Double tap the ESC button to switch between the order editor and order options.

Order options

When you double tap the ESC button, the cursor switches to the list of options on the left side of the screen. You can switch between editing modes here and do some editing actions.

MODE

Switch back and forth between the pattern sequence and pattern transposition editing modes. Current mode is displayed as POS and TRAN respectively.

INS

Select this option to insert an empty row into the cursor position, shifting the contents below one row down.

DEL

Select this option to delete a row in the cursor position, shifting the contents below one row up.

SEL

Switches between the block selection and regular editing. When you select this option, cursor movements in the order list will start to define a selection that is originating from the previous cursor position.

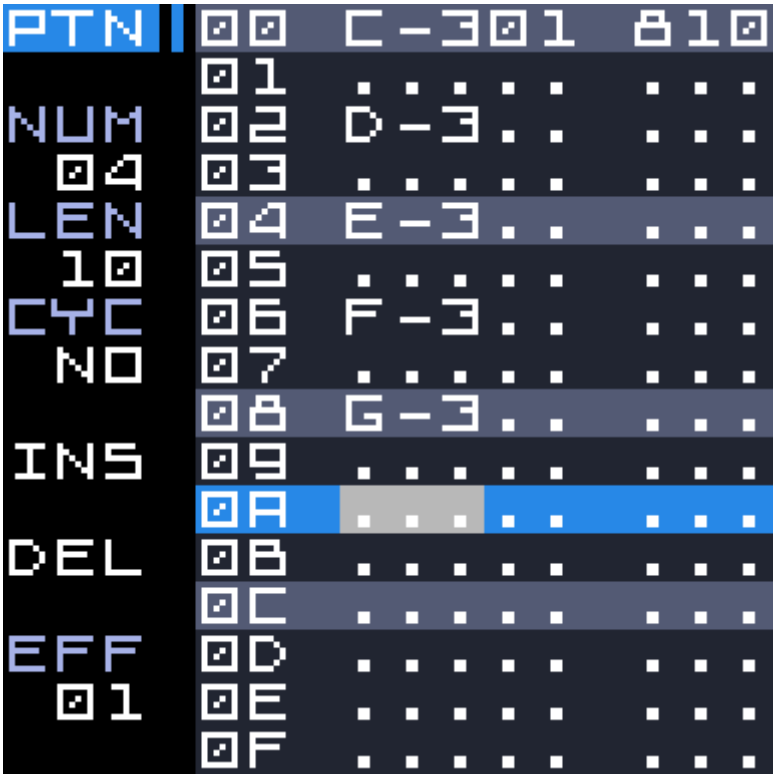
Once a block is selected, you can place it into the clipboard at the NAVI screen using the ACT button, to be pasted into the cursor position using the NAVI screen and ESC button.

ABCD

These squares are channel mute controls. Muting is only applied when the song is played from the ORD screen.

PTN screen

The PTN screen is where you edit a pattern. You can set its length, enter notes, instrument numbers, and effects.



General editing

Press the ACT button on an empty field to enter a last used note or value there.
Press ACT and ESC simultaneously to delete a field

Hold the ACT button and press Up/Down/Left/Right to change a field, which is a note or a parameter. Pressing Up/Down on a note changes the octave, otherwise it changes the most significant digit in a hexadecimal value.

Hold down the ESC button and press Up/Down to quickly move through the pattern.

Hold down the ESC button and press Left/Right to quickly change the current pattern (if the cursor is in the note or instrument columns), or the current effect column (if the cursor is in the effect column).

Double tap on the ACT button while the cursor is located at a non-empty instrument number field to quickly switch to the INS screen with this instrument selected.

Double tap on the ESC button to switch between the pattern editor and pattern options.

Pattern options

When you double tap the ESC button, the cursor switches to the list of options on the left side of the screen. You can change some pattern parameters there and do some editing actions.

NUM

The current pattern number. Usually it is the one currently selected at the ORD screen, but you can switch to any other pattern, for example, if you need to do some Copy and Paste actions.

EFF

The number of one of a few of the effect columns that is currently displayed and edited.

LEN

Sets pattern length in rows. You may want to make short or long patterns depending on a song.

CYC

This option controls the way a pattern behaves when it is used in an order position that includes a longer pattern. If CYC is set to NO, the pattern will stop until the next order position. If CYC is set to YES, the pattern will wrap around, i.e. will continue to play from beginning.

INS

Select this option to delete a row in the cursor position, shifting the contents below one row up.

DEL

Select this option to delete a row in the cursor position, shifting the contents below one row up.

Pattern effects

EBT supports a number of MOD-like pattern effects (also known as commands) with a similar numbering scheme. The effects are entered into the two rightmost columns, and consist of a single hex code of the effect type and a couple of hex values for the effect setting.

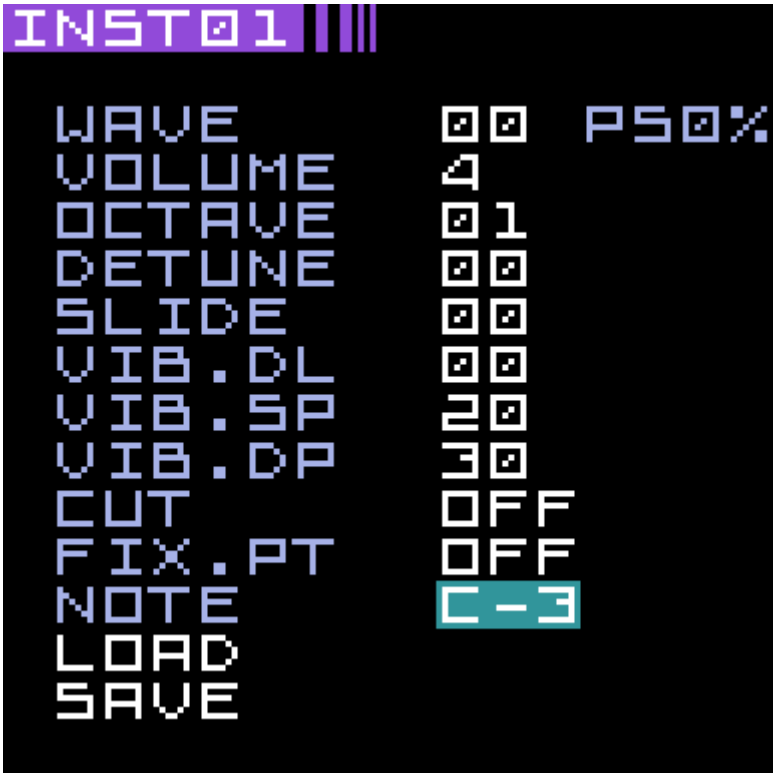
More than one effect can be used per a pattern row.! You can switch between them by holding ESC and pressing Left/Right while the cursor is in the effect column. The column number is displayed in the EFF field and can also be changed via the pattern options menu. When there is an effect that is located in a currently hidden column, a + mark will be displayed.

The effects may apply to a current note in the pattern and have effect until it gets disabled with a corresponding effect with param value 00 (FF in case with the arpeggio). Some effects such as speed change apply to the song settings instead.

Code	Type	Param
0	A simple arpeggio between the base note and two semitone offsets. Arpeggio speed can be tweaked up with the effect E0x.	XY for base+X and base+Y semitones. XX=00 to disable arpeggio.
1	Slide up	XX ticks, greater value means faster slide. Gets disabled with XX=00
2	Slide down	
3	Portamento, a smooth pitch change towards a new note	XX ticks, greater value means faster change
7	Set a specific phase to the sound generator, may come handy to some waveforms	XX is 00..FF
8	Stereo pan, only applicable for stereo output sound devices	XY, X for the left and Y for the right channel, 0 to disable side, non-0 to enable it. So 10 for the left, 01 for the right, anything else for center (including 00)
9	Override instrument waveform in a channel	XX is 00..1F
C	Override instrument volume in a channel	XX is 01..04
E	Extra options	XY where X is the option number and Y is the option parameter
E0X	Arpeggio speed.	X is 1 by default, 2 or greater for a slower arpeggio.
F	Speed settings change. The same effect can be used to change both speed and the interleave factor.	XY to set speed 1 to X and speed 2 to Y 0X to set the interleave factor

INST screen

The INST screen allows configuring instruments to be used in a pattern.



You can move the cursor between instrument parameters using Up and Down. The usual approach with holding down the ACT button is used to edit the parameter values.

You can change the currently edited instrument by holding down the ESC button and pressing Left or Right. This is to prevent accidental instrument number changes.

To hear however the current settings are sounding, hold down the RGT button. It will use the pitch specified in the NOTE field, which can be different for each of the instruments.

WAVE

Selects one of the 32 waveforms available in the sound synthesis engine. Short abbreviations are displayed next to the waveform number.

VOLUME

Default instrument volume, 1 to 4. Can be overridden from the pattern effects.

OCTAVE and DETUNE

Defines offset from the base note in octaves and pseudo cents. Unlike the traditional musical tuning cents that are a hundred per semitone, there are 256 cents per semitone.

SLIDE

Slide speed up or down applied to an instrument. Useful to create percussion sounds.

MOD.DL, MOD.SP, and MOD.DP

Pitch modulation (vibrato) settings. DL is a delay before modulation starts. SP is the modulation speed. DP is the modulation depth. To disable modulation, just set DP to 0.

Modulation speed and depth can be set to extremes in order to produce unusual sounds. In particular, it can be handy in creating percussive instruments.

CUT

An option to cut a note after some time. Set it to OFF to never cut the sound and have a continuous sound. Set it to a value to cut after this number of frames, to create short percussive sounds.

FIX.PIT

This option makes the instrument ignore the pattern note number and order list transpose setting, and always use NOTE to play this instrument. This is useful for percussive sounds to keep their pitch regardless of the pattern transposition.

NOTE

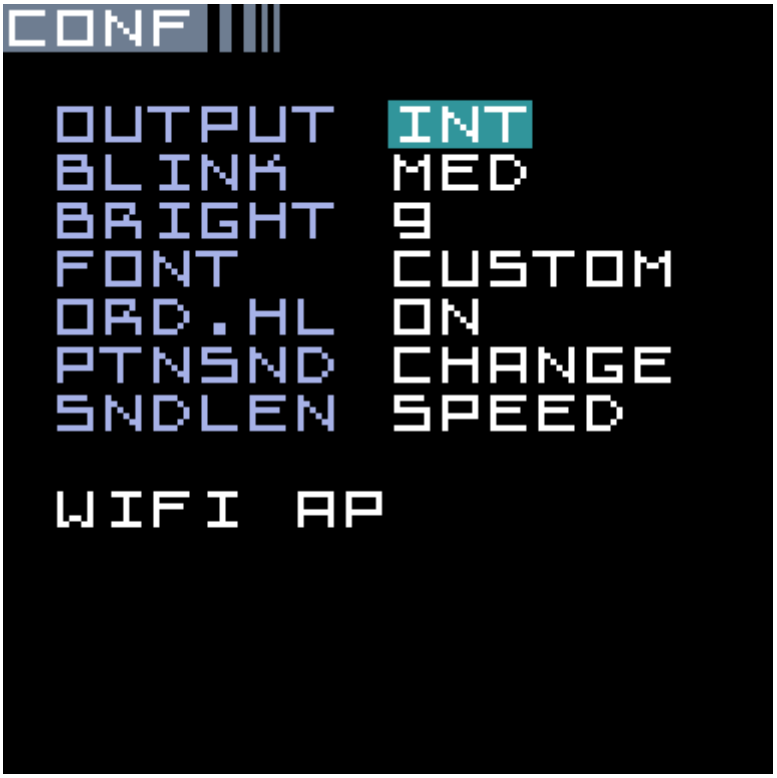
This parameter is used both to test an instrument, defining its testing pitch, and as a fixed pitch value.

LOAD and SAVE

Options to load or save an instrument from or into the internal Flash memory.

CONF screen

The CONF screen contains various editor options, such as sound output device and interface appearance. There is the entry point to the WiFI file exchange mode as well.



OUTPUT

Sound output device. See the appropriate section below.

- INT — built-in speaker driven with the Sigma-Delta Modulation.
- EXT SDM — Sigma-Delta Modulation on an external pin.
- INT+EXT — both INT and EXT SDM at the same time.
- EXT PWM — an external PWM-driven stereo output.
- EXT I2S — an external i2s DAC-driven stereo output.

BLINK

Cursor blinking speed, from lack of blinking, to slow, to fast. Comes handy to easily spot the cursor on the tiny screen.

BRIGHT

Screen brightness, 1..9. This option will have no effect on the ESPboy easy DIY version, as it does not have the electronics necessary to control the brightness from the software.

FONT

Selects between a custom font or a few classic ones to be used all through the user interface, whichever seem to be more readable on the tiny screen.

ORD.HL

Enables and disables order list highlight mode. When it is enabled, patterns with the same numbers as a currently selected mode will be displayed in a different color, making it easier to see the song structure.

PTNSND

Selects one of ways to play sound in the pattern editor:

- MUTE produces no sound during editing.
- PRESS only plays a currently active row when ACT is pressed on it.
- CHANGE also plays the row after any change.
- RELEASE only plays the row when ACT gets released.

SNDLEN

Sets the duration of sound played in the pattern editor. It can be set to SPEED to match the duration of a row with current song settings, or be overridden with a given value, in case you prefer shorter or longer sounds.

WIFI AP

Select this option to put ESPboy into the WiFi file exchange more. See the appropriate section below for details.

Sound engine

As the ESPboy does not feature an actual sound synthesis hardware with a distinctive sound, and basically it can produce any sound in software within its processing power limits, I've had to create a software sound engine that would give it a voice that is unique enough. It was also to be sounding loud enough on the tiny built-in loudspeaker, and allow you to use the music created with the editor in a newly made software as well.

EBT features a lightweight software synthesis sound engine with a chiptune-like sound. It is modeled after the unusual synthesis approach developed by utz in his wtbeep ZX Spectrum beeper music engine that creates a handful of timbres somewhat similar to what Atari 2600 would produce. It is not a full emulation of the wtbeep capabilities, though, just modeled along its lines.

While pattern and effects are running on the usual 60 Hz update rate, the sound synthesis engine features an internal update rate of 240 Hz for its pitch slide and modulation effects, which gives the sound some characteristics of ZX Spectrum beeper effects or perhaps early arcade titles.

Waveforms

The engine features 32 waveforms:

Hex	Short name	Full description
00	P50%	Pulse wave with 50% duty cycle (square wave, the fattest clean one)
01	P32%	Pulse wave with roughly 32% duty cycle
02	P25%	Pulse wave with roughly 25% duty cycle
03	P19%	Pulse wave with roughly 19% duty cycle
04	P12%	Pulse wave with roughly 12% duty cycle
05	P06%	Pulse wave with roughly 6% duty cycle (the thinnest clean one)
06	SWPF	A tone with fast phase sweep
07	SWPS	A tone with slow phase sweep
08	SWLO	A slow phase sweep with a low octave harmonic
09	SWHI	A slow phase sweep with a high octave harmonic
0A	DSS-	Duty sweep with a low octave harmonic
0B	DSS+	Duty sweep with a high octave harmonic
0C	DSF-	Fast duty sweep with a low octave harmonic

0D	VOW1	A vowel-like pulse wave, least crisp
0E	VOW2	A vowel-like pulse wave
0F	VOW3	A vowel-like pulse wave
10	VOW4	A vowel-like pulse wave
11	VOW5	A vowel-like pulse wave
12	VOW6	A vowel-like pulse wave, with a highest harmonic
13	RSP1	Rasp 1
14	RSP2	Rasp 2
15	PHT1	Phat 1
16	PHT2	Phat 2
17	PHT3	Phat 3
18	PHT4	Phat 4
19	PHT5	Phat 5
1A	PHT6	Phat 6
1B	PHT7	Phat 7
1C	NSE1	Noise type 1
1D	NSE2	Noise type 2
1E	NSE3	Noise type 3
1F	NSE4	Noise type 4

Sound devices

The ESPboy version of EBT supports a handful of sound output devices, ranging from the tiny internal speaker to a high fidelity external i2s stereo DAC.

The external sound options can be easily built using the off-the-shelf electronics parts and/or modules. The schematics are provided for each of these.

Internal speaker

A single delta modulation driven output via D3 line that is normally routed to the built-in speaker. It is the most basic option, always available on each and every ESPboy. It is very quiet on the regular versions, though, so it is likely to be used just as a quick check option. The ESPboy easy DIY version has a speaker that is loud enough for practical use.

External SDM

The most basic of the external options. Basically it connects the headphone jack to the D6 (MISO) pin, which is pin 8 of the expansion slot. It is always monophonic.

The way it generates the sound is the same way, via sigma delta modulation, so the quality isn’t great, but now you can hear it better, or connect to an external gear. This option can also route the sound into the internal speaker at the same time.

External PWM

A software-driven PWM that enables stereo output. It uses D6 (MISO) and D8 (SS) for the left and right channels respectively.

It does not use the standard software PWM implementation from the Espressif SDK, it rather uses a very crude implementation of two 4-bit PWM channels. The sound is quieter than the SDM option, but has a reasonably good quality.

External I2S

The best option available, it uses an external i2s DAC module, for example, PCM5102 one. It provides stereophonic output with the best sound quality. The DAC module gets connected to the expansion slot.

Pinouts

Here is the ESPboy expansion slot pinout. It is facing into the pins when the device is located with the screen up. You can also trace where the power pins are located to figure out the orientation.

Pin	20	18	16	14	12	10	8	6	4	2
Name	TX	RX	D1/SCL	D2/SDA	D4/LED	D8/SS	D7/MOSI	D6/MISO	D5/SCK	ADC0
Name	VCC	GND	RESET	GPIO16	GPB2	GPB3	GPB4	GPB5	GPB6	GPB7
Pin	19	17	15	13	11	9	7	5	3	1

To connect external monophonic output for the EXT SDM option:

External connection	ESPboy signal name	ESPboy pin
Output	D6	6
GND	GND	17

To connect external stereo output for the EXT PWM option:

External connection	ESPboy signal name	ESPboy pin
Left output	D6	6
Right output	D8	10
GND	GND	17

To connect a PCM5102 i2s module for the EXT I2C option (pin names may vary):

Module pin	ESPboy signal name	ESPboy pin
VIN	VCC	19
GND	GND	17
LCK or WSEL	D4 (I2S0-WS)	12
DIN	RX (I2S0-DATA)	18
BCK or BCLK	SS (I2S0-BCK)	10
SCK (if present)	via 10K resistor to GND	19

File exchange

The song and instrument files are stored in the ESPboy's internal Flash memory located inside the ESP8266 chip. In order to transfer the files to and from the device, the WiFI functionality of the ESP chip is used.

To get into file exchange mode, go to the CONF screen, select WIFI AP mode. Don't forget to save your work beforehand, as there is no going back from the WiFi mode into the song editor!

When ESPboy goes into the WiFi mode, it acts as a WiFI Access Point, so you can connect to the WiFI network it creates with any WiFi-equipped device. For a desktop PC, you can get a USB WiFi dongle. To connect, use the SSID, login and password as shown at the ESPboy screen.

When the remote device establishes a connection, you can run any web browser on and type in the IP address shown at the ESPboy screen into the address bar. A ESPboy-hosted web interface will open up. Now you can download and upload particular files to and from internal memory of the device, or download a full backup as a ZIP archive.

Warning! You will need a relatively modern web browser and internet connection in order for the full backup script to work, as it uses externally hosted JQuery and JSZip libraries.

File formats

There are two file formats, *.EBT for songs (modules), and *.ETI for particular instruments. *.EBT also includes instrument descriptions in the same format as featured inside the *.EBT.

The file formats are minimalistic, but plain text ones, mostly human readable and easy to parse. They consist of a number of two-character tags followed by a hexadecimal value that can be one to a few bytes long.

A file starts with a signature text string that defines its contents. At the moment it is ebtsongv1 or ebtinsv1 for a song and an instrument file respectively.

A few sections with their own respective opening and closing tags are following.

Tag	Contents	Value
Header		
ebtsongv1	Song format signature	
ebtinsv1	Instrument format signature	
Main settings		
ms	Section opening tag	
se	Speed even	Hex byte
so	Speed odd	
si	Speed interleave factor	
me	Section closing tag	
Order list		
or	Section opening tag	
ls	Loop start	Hex byte
le	Loop end	Hex byte
NN	An order list row. Starts with a hex value of the row number	8 hex bytes, channels in parts of pattern position and pattern transpose. That is, PPTTPPTTPPTT, where PP is a position byte, and TT is a transpose byte
oe	Section closing tag	
Pattern		
pt	Section opening tag	Hex byte number of the pattern
ln	Pattern length	Hex byte

lp	Pattern loop flag	Hex byte
NN	A pattern row. Starts with a hex value of the row number	9 hex digits in a format that is NNIIEPP.., where NN is note code, II is instrument number, E is effect code, and PP is effect parameter value. The EPP part may repeat a few times, for a few effects, or be missing if there are no effects.
pe	Section closing tag	
Instrument		
in	Section opening tag	Hex byte number of the instrument
wa	Waveform	Hex byte
vo	Volume	
oc	Octave	
dt	Detune	
sl	Slide	
md	Modulation delay	
ms	Modulation speed	
me	Modulation depth	
ct	Cut time (0 off)	
fp	Fixed pitch flag	
bn	Base note	
ie	Section closing tag	

Version history

v1.0 20.10.23 - First public release

Pre-release:

04.10.23 - Documentation draft edit
26.09.23 - Development started

Credits

EBT source code shiru8bit. All code by shiru8bit is under WTFPL, you can do whatever the fun you want.

ESPboy and related supporting code Roman Sokolov.

Sound synthesis algorithm by utz (wtbeep beeper engine).

Links and Donate

http://shiru.untergrund.net/
https://www.espboy.com/

shiru@mail.ru

https://www.youtube.com/shiru8bit
https://twitter.com/shiru8bit
https://www.patreon.com/shiru8bit
https://shiru8bit.bandcamp.com/

As an experiment, I decided to provide a way to motivate the further project development via a crypto donation.

ETH: 0xeAf241AD4c87A9aBBa8971Ab623232b2F89915Fd