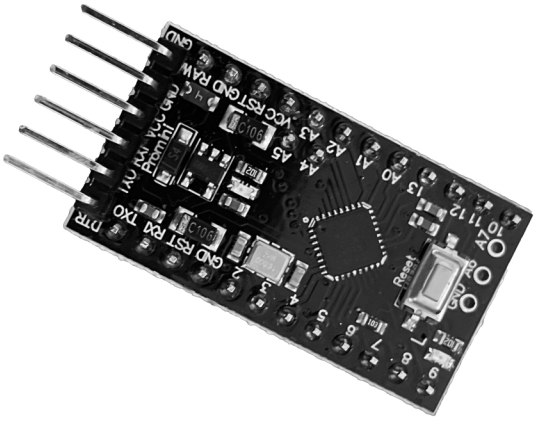
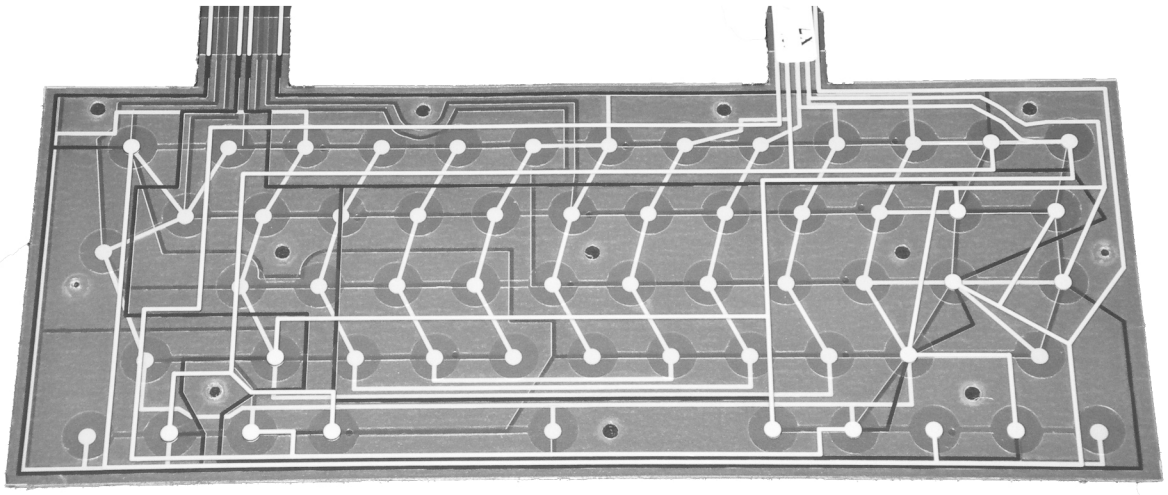
# ZXUnoPS2

## Manual





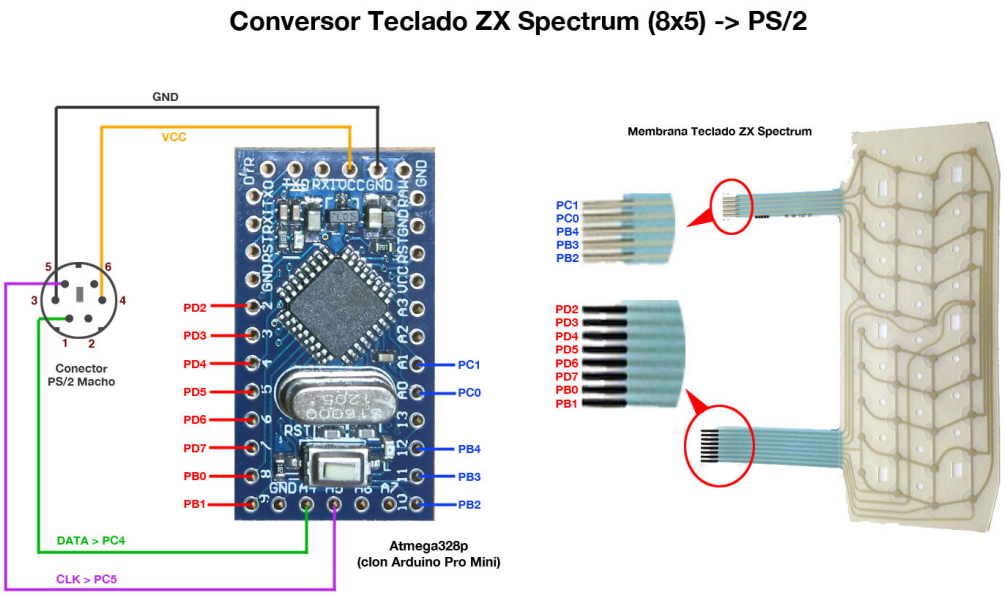
# Index

# Introduction

zxunops2 is a converter from ZX Spectrum membrane keyboard to PS/2, used to control a ZX-Uno.

- Quest Original code base
- Neuro (@neurorulez) First version and keyboard shortcuts
- @spark2k06 improvements, optimizations and new keyboard shortcuts
- Thanks to @desUBIkado for being a tester and give new ideas for the alternate version

The connection is through an Arduino board, which converts the key presses to PS/2 protocol, using zxunops2 firmware. The board is programmed in such a way that it can behave differently (keyboard mode), according to your needs.



# Keyboard modes

The default is ZX Spectrum mode. To change to a different mode, you must press `Caps Shift+Symbol Shift+F`, then `U`, and then the key for the desired mode. After doing that, some text is automatically typed, to show the selected mode (for example `.zx` if you press `Caps Shift+Symbol Shift+F`, `U`, and then `1`).

| Mode | Key |
|---|---|
| ZX Spectrum | `0` |
| Amstrad CPC | `1` |
| MSX | `2` |
| Commodore 64 | `3` |
| Atari 800XL | `4` |
| BBC Micro | `5` |
| Acorn Electron | `6` |
| Apple (I and II) | `7` |
| Commodore VIC 20 | `8` |
| PC XT | `9` |
| Oric Atmos | `A` |
| SAM Coupé | `B` |
| Jupiter ACE | `C` |
| Sega Master System | `D` |
| Commodore 16 / Plus 4 | `E` |
| HT-1080Z / Video Genie / TRS-80 Model I G – Galaksija | `F` |
| Galaksija | `G` |
| Multicomp | `H` |

The ZX keyboard mode can behave in two different ways, which you can switch using Caps Shift+Symbol Shift+F and then D:

- Conventional mode, with access to the original Caps Shift and Symbol Shift but no access to special keys or modifier keys.
- Full mode, without access to Caps Shift or Symbol Shift but access to special and modifier keys just like the other keyboard modes.

In general, the keyboard layout (except on ZX conventional mode), showing the keypress obtained when combining Caps Shift+Symbol Shift (in full mode), is resumed here:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |
|---|---|---|---|---|---|---|---|---|---|
| F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 | F9 | F10 |
| **Q** | **W** | **E** | **R** | **T** | **Y** | **U** | **I** | **O** | **P** |
| F11 | F12 | * | - | Print Screen | Scroll Lock | Pause | Shift Lock | ([ and ^) | + (* and ]) |
| **A** | **S** | **D** | **F** | **G** | **H** | **J** | **K** | **L** | **Enter** |
| Shift | < and > | + | | Insert | Start | Page Up | Ñ | ´ ({ and ¨) | ç (}) |
| **CShift** | **Z** | **X** | **C** | **V** | **B** | **N** | **M** | **SShift** | **Space** |
| | Ctrl | Win | Alt | Del | End | Page Down | Alt Gr | | |

You don't have to stop pressing Caps Shift+Symbol Shift when combining modidier keys (e.g. for Mayús.+F10 with Caps Shift+Symbol Shift+A, and Caps Shift+Symbol Shift+0).

Pressing Caps Shift+Symbol Shift+F, U, and an invalid key , types the name of the current mode.

The source code, binaries and more instructions about the keyboard firmware can be found at the offical repository.

Caps Shift+Symbol Shift+I behaves differently on the following cores:

- Commodore 16 and VIC-20: Num Lock
- Commodore Pet: Menu key (next to Alt Gr), used as Shift Lock

It's not recommended to use the PC XT mode, while also using a PS/2 keyboard

# Functions

Pressing Caps Shift+Symbol Shift+F and then a special key, enables several special functions.

The full function list is this one:

| Key | Action | Compatible Modes |
|---|---|---|
| V | Type Version | All |
| X | Save config to EEPROM | All |
| B | Ctrl+Alt+Bcksp (Hard Reset) | All |
| N | Ctrl+Alt+Del (Soft Reset) | All |
| Y | Ctrl+Alt+F5 (NMI) | ZX, CPC, Jupiter, SAM, ZX80, ZX81 |
| O | F12 followed by Shift with a 1 sec. pause | BBC |
| H | F8+F10 | Atari |
| U | Change keyboard mode | All |
| C | Map O, P, Q, A keys to the keypad (Atari) or cursor keys | PC, MSX, SMS and Atari |
| D | Enable and disable full ZX keyboard mode | ZX |
| G | Change video mode | ZX, Atari, BBC, VIC, ORIC and HT-1080Z |

C function enables or disables mapping the cursor keys to O, P, Q, A and M is exchanged with Space. It works with all keyboard modes execept:

- C64 and Atari 800XL modes: instead of cursor keys, the map is to 8, 4, 6 and 2 of the keypad, and M to key 0 (fire)
- Jupiter ACE: instead of cursor keys, the map is to 8, 4, 6 and 2 of the keypad, and M and 'Space' are exchanged.

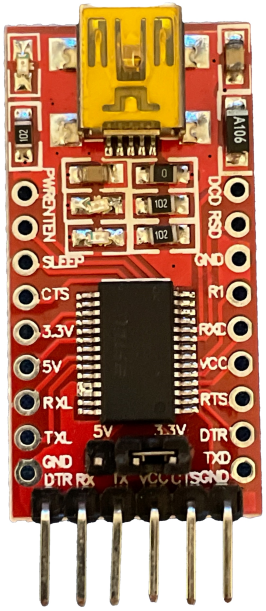
All keyboard modes try to match most of their symbols to those printed on the Spectrum keyboard. This way Symbol Shit+M obtains “.” or Symbol Shift+K obtains +. On some keyboards, a few symbols have been changed for more useful ones. For example, on version 1.3 spanish MSX, Symbol Shift+E obtains “¡” and Symbol Shift+I obtains “¿”.

# Firmware update

In order to install the firmware, a computer is needed (Windows, Mac, Linux).

**Hardware needed**:

- Computer (Windows, Mac, Linux)
- 6 jump wires (if possible, female on both sides)
- USB serial adapter (FTDI)

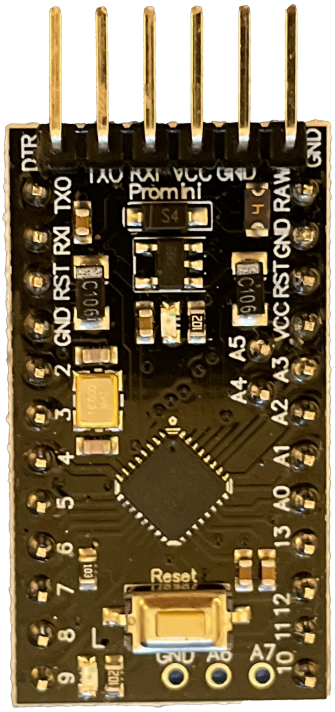



**Software needed**:

- XLoader (only for Windows) or AVRDUDE (you can use the embeded version in Arduino IDE). - `.hex` binary file for the firmware version to install, which you can download from the official repository (usually, the file is one whoe name ends with `-328.hex`).

### Preparation

Unplug the Arduino board (if needed), and locate all the conections.




Plug the serial adapter with the Arduino board, using this guide:

| USB FTDI | Arduino Mini |
|---|---|
| DTR | DTR |
| RX | TXO |
| TX | RXI |
| VCC (3.3V) | VCC |
| CTS | GND |
| GND | GND |

Plug the USB adapter to the computer, and find out the connected port (`COM`, `/dev/usb⋯`, etc.).

# xLoader

Choos the following parameters:

- Device: Duemilanove/Nano (ATMega328)
- Baud rate: 57600
- Port: COM port for the adapter

Click "Upload" and wait until a message is shown saying "xx bytes uploaded".

# AVRDUDE

Use a command with this syntax:

```
avrdude -U flash:w:<firmwre file.hex>:i -e -p atmega328p -b 57600 -c arduino -P <USB
port>
```

When using the `avrdude` binary included with Arduino IDE, you also have to add the path to the included `.conf` file. For example, on MacOS:

```
/Applications/Arduino.app/Contents/Java/hardware/tools/avr/bin/avrdude       -U
flash:w:zxunops2-25092021-328.hex:i  -e  -p  atmega328p  -b  57600  -c  arduino  -P
/dev/cu.usbserial-A50285BI                                                   -C
/Applications/Arduino.app/Contents/Java/hardware/tools/avr/etc/avrdude.conf
```