



VEXXON – User Manual

For the PiTrex / Vectrex edition.

This manual is the companion to the **Quick Start Guide**. The Quick Start gets you flying in a minute (goal, controls, HUD, the basics). This manual covers everything else: every setting and what it does, how to calibrate the vector display, the files on your SD card, and troubleshooting.

Everything here applies to the **PiTrex baremetal** version — the game running directly on a Raspberry Pi Zero (or Zero 2) plugged into your Vectrex via the PiTrex interface.

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1. Introduction

1.1 What this manual covers

The Quick Start Guide is enough to start playing. Read this manual when you want to:

- Fine-tune how the game looks on **your** Vectrex (calibration).
- Change and **save** settings (HUD, view, sound).
- Understand the difficulty that ramps up after you win.

- Know what every file on the card is for.
- Fix a display or boot problem.

1.2 What you received

Your SD card is a personalised VEXXON card. On boot it shows **your name** and a **serial number** (e.g. N0. 042). The card contains the game for both Pi Zero and Pi Zero 2, plus its configuration files (see [Section 8](#)).

2. Getting Started on PiTrex

2.1 Inserting the SD card and booting

1. Power off the Vectrex.
2. Insert the VEXXON SD card into the Raspberry Pi on your PiTrex.
3. Power on. The Pi boots and the game appears on the Vectrex screen after a few

seconds.

The card automatically boots the right build for your board.

2.2 The startup splash

For the first few seconds you see the **owner splash**: the game title, your name, and your serial number (N0. nnn). This is baked into your personal card.

2.3 First run: what to expect

After the splash the **start screen** appears (rotating fighter, "PRESS BTN"). Press **Button 1** to start a game. If the image looks off-center, skewed, or too dim/bright, go to [Calibration](#) — it is normal to calibrate once for your specific Vectrex.

3. Controls

3.1 Joystick and buttons

VEXXON is a 3D game: the joystick moves your fighter **up/down** (altitude) as well as **left/right**. Altitude is the single most important thing to master — you fly *over* and *under* obstacles, not just around them.

Input	In-game	In the menu	Start screen
Joystick	Move (left/right + altitude)	Move selection up/down, change values left/right	—
Button 1	Fire (hold to keep firing)	Select / confirm	Start the game
Button 2	Drop bomb	Back / up one level	—
Button 3	Open/close the settings menu	Close the menu	Open the settings menu
Button 4	Pause / resume	—	Enter calibration

3.2 Button context

Buttons 3 and 4 change meaning depending on where you are:

- **Button 3** opens the settings menu from gameplay or the start screen, and

closes it again.

- **Button 4** is **Pause** while you are playing, but on the **start screen** it

opens the **calibration** screen. It does nothing while the menu is open.

4. The In-Game Menu

Press **Button 3** to open the menu (from the start screen or during play). Navigate with the joystick, select with **Button 1**, and go back / close with **Button 2**.

The top-level menu contains:

- **Music** — turn the background music on/off.
- **SFX** — turn sound effects on/off.
- **Controls** — control-related options (5.1).
- **HUD** — show/hide and position the on-screen readouts (5.2).
- **View** — vector projection and line rendering (5.3).
- **Sounds** — audition every sound and jingle (5.4).
- **Save Settings** — write the current settings to the card (4.1).
- **Restart Game** — start a fresh run.

4.1 Saving your settings

Changes you make in the menu take effect **immediately**, but they are only **temporary** until you save them. Select **Save Settings** to write them to `vexxon.ini` on the card. The entry briefly shows **SAVED** to confirm (or **FAIL: ...** with a reason if the write did not succeed).

On the next boot your saved settings are loaded automatically.

5. Settings Reference

5.1 Controls

Control options such as swapping the up/down joystick direction.

5.2 HUD

The HUD shows your **score**, **fuel** and **ammo (bullets)**. In this submenu you can:

- Show or hide each element individually.
- Move each element to a different position on screen (X/Y), useful if your

Vectrex overlay or personal preference wants them elsewhere.

5.3 View

Controls how the 3D world is projected onto the Vectrex and how lines are drawn.

Setting	What it does
Offset X / Offset Y	Move the whole picture horizontally / vertically.
Scale X / Scale Y	Stretch the picture width / height.
Scale Z-X / Scale X-Y / Scale Z-Y	Tune the isometric projection angles (how depth maps to the screen).
Seg Length	Length of each line segment. Long straight lines are drawn in segments to stay straight on the analog display; smaller values = straighter but more segments.
Seg Cap	Maximum number of segments per line.
Reset to Defaults	Restore all View values to the shipped defaults.

The **View** menu keeps the walls visible behind it, so you can tune against the live geometry. If long lines look bent, lower **Seg Length**; if the whole picture is off-center, use **Offset X/Y** (or do a full [Calibration](#)).

5.4 Sounds

An audition menu. **Music Start / Music Stop** control the theme; the remaining entries play each sound effect and jingle once so you can hear them (Explosion, Player Shot, Gun Tank, Enemy Ship, Wall Crash, Powerup, Fuel, Player Hit, Bomb, Rocket, and the Title/Mission/Powerup/Alert/Fuel-Low/Game-Over jingles).

6. Calibration

Every Vectrex is slightly different. Calibration aligns VEXXON's vector output to **your** screen — centering, size, brightness and beam timing. You normally do this once.

6.1 Entering the calibration screen

From the **start screen**, press **Button 4**. A calibration screen appears showing a reference circle and one adjustable value at a time.

6.2 Adjusting values

- **Joystick up/down** — select which value to adjust.
- **Joystick left/right** — decrease / increase the selected value.

The reference **circle** is the most sensitive shape for spotting distortion: when it looks like a clean, centered circle, your calibration is good.

6.3 The values

Value	Range	What it does
Offset X	–200... 200	Horizontal position of the picture.
Offset Y	–200... 200	Vertical position of the picture.
Size X	0.5...1.5	Horizontal size (1.0 = normal).
Size Y	0.5...1.5	Vertical size (1.0 = normal).
Strength	50...127	Beam drive strength (line reach).
Brightness	50...127	Overall beam brightness.
Delay Zero	0...100	Timing wait after the beam returns to zero. Lower = faster draw; too low garbles the image.
Delay T1	0...50	Fine beam timing.
Scale Str Dif	0...10	Strength scaling difference.
Minscale	1...20	Minimum draw scale.
Orientation	0...3	Screen rotation (0 = normal, 1 = left, 2 = up, 3 = right).

Start with **Offset X/Y** and **Size X/Y** to get a centered, correctly-sized circle. Only touch **Delay Zero / Delay T1 / Strength** if the image looks garbled or lines are broken — small changes have a big effect.

6.4 Saving or discarding

- **Button 3 — Save & exit.** Writes the values to `vectrexInterface.ini` on the

card, so they survive a reboot. A brief **SAVED** confirmation is shown.

- **Button 4 — Exit without saving.** Keeps the values for this session only;

the old values return on the next boot. Use this to experiment safely.

7. Gameplay Depth

The Quick Start covers the basics. Here is what it leaves out.

7.1 Fuel management

Your fuel drains constantly. Shoot a fuel tank to top it up. Running out of fuel ends the run (the crash screen shows NO FUEL). Fuel is capped at full — you cannot over-fill.

7.2 The three sections

A run is a single continuous flight through three sections:

1. **Fortress** — corridors with walls of different heights.

The main challenge is to watch for gun tanks, avoid the walls, and either destroy the laser walls or shoot a hole into a destructible wall to pass through.

1. **Space** — open dogfighting against the Vector Swarm. Enemy ships use

patrol, sine-wave, circular and figure-8 movement patterns. An **alert** jingle marks the start of this section.

1. **Boss** — the final robot. Hitting the boss (and its blocks) also refills

some fuel. Defeat it to win.

7.3 Scoring and the Bullet Bonus

When you defeat the boss, a **BULLET BONUS** screen counts your remaining ammo into extra points before the victory screen. It stays visible for a moment even if you have little ammo left.

7.4 Rising difficulty (playthrough)

VEXXON rewards mastery. **After you win, the game restarts harder** — and each win stacks on the previous one:

- **Round 2+** — gun tanks and enemies fire more often.
- **Round 3+** — enemy bullets travel faster.
- **Round 4+** — gun tanks also fire vertically (full 3D), not just horizontally.

The current round is shown as **ROUND n** on the start and end screens. A Game Over returns you to the start screen for a fresh run.

7.5 The end screens

- **Game Over** and **Victory** show your score, best score and current round,

then wait for a button press.

- Press **Button 1** to return to the start screen. (You must release and press

again — a held fire button will not immediately launch a new run.)

8. Files on the SD Card

The card is a normal FAT32 card. Its files:

File	Purpose
kernel.img	Game build for Pi Zero (ARMv6).
kernel7.img	Game build for Pi Zero 2 (ARMv7).
bootcode.bin, start.elf, fixup.dat	Raspberry Pi firmware (boot).
config.txt	Selects the right kernel per board and sets clocks.
vexxon.ini	Your game settings (HUD, view, sound...). Written by Save Settings .
vectrexInterface.ini	Vectrex calibration. Written by the Calibration screen.
title.ym	Title music.
version.txt	Version / build information (see below).

8.1 Reading version.txt

version.txt identifies exactly which build is on your card:

```
version=1.10      game version
build=632         build number
date=20260714125425  build date/time
commit=88a9024    source revision
```

Quote the `build` and `commit` if you ever report an issue.

8.2 Editing vexxon.ini by hand (advanced)

You can edit `vexxon.ini` on a computer to preset values without using the menu. It is a plain text `key = value` file; see the [Appendix](#) for the keys. Keep a backup of the original card first.

9. Troubleshooting

9.1 Black screen / does not boot

- Confirm all firmware files are on the card (`kernel.img` , `kernel7.img` , `bootcode.bin` , `start.elf` , `fixup.dat` , `config.txt`).
- The card must be **FAT32**.
- Make sure the Pi and PiTrex are seated correctly and powered.

9.2 Picture off-center, wrong size, or distorted

This is normal for an un-calibrated Vectrex — go to [Calibration](#). Start with **Offset X/Y** and **Size X/Y**. If lines are broken or garbled, adjust **Delay Zero** / **Delay T1** in small steps.

9.3 Lines look bent or wavy

Lower **Seg Length** in the **View** menu (or reduce it in `vexxon.ini`).

9.4 Settings do not persist

Make sure you selected **Save Settings** (game) or pressed **Button 3** to save in the calibration screen. The confirmation is **SAVED**; if you see **FAIL: ...**, the card may be write-protected or full.

9.5 No sound

Check **Music** / **SFX** are **ON** in the menu, and use the **Sounds** menu to audition an effect.

10. Appendix

10.1 `vexxon.ini` keys

Game settings, written by **Save Settings**.

Key	Meaning
hudScoreShow / hudScoreX / hudScoreY	Score readout: visible + position
hudFuelShow / hudFuelX / hudFuelY	Fuel readout: visible + position
hudBulletsShow / hudBulletsX / hudBulletsY	Ammo readout: visible + position
isoProjOffsetX / isoProjOffsetY	Picture offset (View)
isoProjScaleX / isoProjScaleY	Picture scale (View)
isoProjScaleZtoX / isoProjScaleXtoY / isoProjScaleZtoY	Projection angles (View)
segmentLen	Line segment length (View)
maxSegments	Max segments per line (View)
musicEnabled	Background music on/off
sfxEnabled	Sound effects on/off
swapUpDown	Invert joystick altitude

10.2 vectrexInterface.ini calibration keys

Written by the calibration screen. Corresponds to the values in [Section 6.3](#): OFFSET_X , OFFSET_Y , SIZE_X , SIZE_Y , MAX_USED_STRENGTH , BRIGHTNESS_MAX , DELAY_ZERO_VALUE , DELAY_AFTER_T1_END_VALUE , ORIENTATION , and related timing values.

10.3 Credits

VEXXON — an isometric vector arcade shooter for Vectrex / PiTrex. See `version.txt` on your card for the exact build.

All thanks go to the **PiTrex team — Malban, Graham and Kevin** — for creating this awesome card that makes VEXXON on the Vectrex possible.

10.4 Your personal copy

This VEXXON card is **your personal copy**. If your SD card ever fails, you can always download a fresh image from **rogerboesch.games** using your personal **token**. Updates and fixes will be available there too.

10.5 License

You may not distribute the game or any part of it. **All rights reserved. © 2026 by Roger Boesch.**