Do-It-Yourself Arcade Controls

Under construction.

Using Controller Interfaces

Many DIY or prebuilt arcade cabinets, cocktail tables, and bartops use an **encoder/controller board** to connect joysticks and buttons to the system running Batocera (for example, Ultimarc I-PAC devices or JAMMASD boards). These boards often present themselves as a **keyboard**, meaning button presses generate keyboard **KEY_** events.

Keyboard-style input isn't always ideal for emulation, because some systems and configurations expect a **gamepad/controller** device (for example, devices recognized as joystick/gamepad input rather than a keyboard). Some boards (like certain Ultimarc models) can be switched to appear as **DInput/XInput** controllers, but cabinets often add another wrinkle: they may include dedicated buttons for cabinet functions like **Menu**, **Exit**, and **Pause**.

Normally, Batocera uses a `HOTKEY + ANOTHER BUTTON` combination to trigger actions like Menu, Exit, or Pause (see Hotkey shortcuts). With dedicated cabinet buttons, requiring an additional hotkey can be redundant.

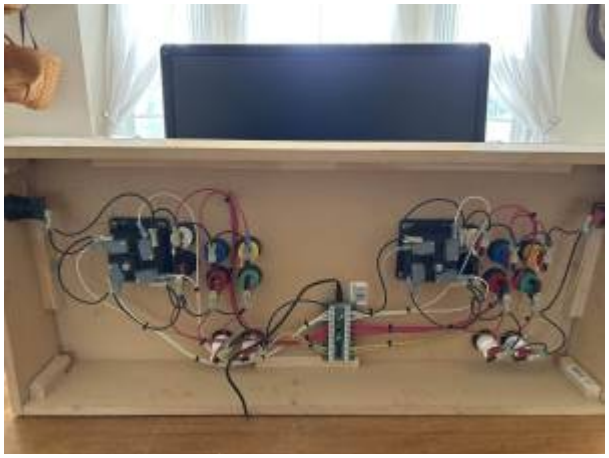
Since Batocera v41, two tools help address these common cabinet needs:

- `keyboardToPads`: Converts specific keyboard-style encoders into one or more **virtual controller** devices by remapping input events (so they behave like standard controllers in emulators).
- `Hotkeygen`: Listens for specific **KEY_/BTN_ events** from input devices and triggers Batocera hotkey actions (Menu/Exit/Pause, etc.) by emitting the configured key sequence (or running a command). This makes **dedicated cabinet buttons** work without requiring a separate hotkey button.

These tools can be used together: `keyboardToPads` can produce clean controller-style inputs, and `hotkeygen` can interpret selected button events as hotkey actions.

Gallery

Below are some images of either prebuilt or custom build arcade controllers.



Arcade Cabinet Retailers and License Compliance

Some prebuilt arcade cabinet vendors distribute Batocera and related software without clearly meeting the licensing and attribution obligations.

The following retailers have been reported to respect licensing requirements:

- https://iconicarcade.com/
- https://recroommasters.com/

Hotkeys

Contextual hotkeys are the way Batocera maps hotkeys to actions in emulators. For each emulator, the emulator hotkeys are referenced and mapped to Batocera hotkeys. The following is the list of hotkeys they may be help when configuring `keyboardToPads` and `hotkeygen`:

Batocera hotkey	Keyboard key equivalent
exit	KEY_EXIT
coin	KEY_EURO
menu	KEY_MENU
pause	KEY_PAUSE
reset	KEY_RESTART
files	KEY_FILE

Batocera hotkey	Keyboard key equivalent
save_state	KEY_SAVE
restore_state	KEY_SEND
next_slot	KEY_NEXT
previous_slot	KEY_PREVIOUS
rewind	KEY_REWIND
fastforward	KEY_FASTFORWARD
next_disk	KEY_VIDEO_NEXT
translation	KEY_SUBTITLE
bezels	KEY_FRONT
swap_screen	KEY_SCREEN
screen_layout	KEY_PRESENTATION
screenshot	KEY_SYSRQ
volumeup	KEY_VOLUMEUP
volumedown	KEY_VOLUMEDOWN
volumemute	KEY_MUTE
brightness-cycle	KEY_BRIGHTNESS_CYCLE

Using and Configuring hotkeygen

Configuring `hotkeygen` will allow you use dedicated cabinet buttons such Menu, Exit, or Pause without having use it in combination with a hotkey.

TIP: Using and configuring `Hotkeygen` and `keyboardToPads` assumes you know how to access Batocera at the terminal and access and manipulate files. If you are unfamiliar with how to do this, consult Access Batocera Via SSH

While Emulationstation is running, the `hotkeygen --list` command will return something similar to :

```
$ hotkeygen --list
Context [emulationstation]:
  exit------------> KEY_ESC
  menu------------> KEY_SPACE
  files-----------> KEY_F1
# device /dev/input/event5 [Ultimarc I-PAC 4] (no Ultimarc_IPAC_4-
d209-430.mapping file found)
  KEY_PAUSE-------> pause
# device /dev/input/event3 [AT Translated Set 2 keyboard] (no
AT_Translated_Set_2_keyboard-01-01.mapping file found)
  KEY_PAUSE-------> pause
# device /dev/input/event23 [Xtension hotkeys] (no
Xtension_hotkeys-00-00.mapping file found)
  KEY_EXIT--------> exit------------> KEY_ESC
  KEY_MENU--------> menu------------> KEY_SPACE
```

```
  KEY_PAUSE-------> pause
```

This example response above tells you:

- The current context is `emulationstation`
- The hotkey “exit” will send the equivalent of the keyboard KEY_ESC (escape key)
- The hotkey “menu” will send the equivalent of the keyboard KEY_SPACE (space bar)
- The hotkey “files” will send the equivalent of the keyboard KEY_F1 (F1 key)
- There are 3 devices are able to generate these events (via KEY_EXIT, KEY_MENU, and so on)
- There is no custom mapping file found for any of the 3 devices. The standard hotkeys will be applied.

Here is another example of context while running PS Portable emulator (`ppsspp`):

```
$ hotkeygen --list
Context [ppsspp]:
  exit------------> ['KEY_LEFTALT', 'KEY_F4']
  save_state------> KEY_F3
  restore_state---> KEY_F4
  menu------------> KEY_F9
  pause-----------> KEY_F9
  next_slot-------> KEY_F6
  previous_slot---> KEY_F5
$
```

You can also simulate the hotkeys from the command line. Within any context, for example, the hotkey “exit” will quit the game. It can be launched via the command:

```
hotkeygen --send exit
```

And when available, the following command will pause the emulator. With most emulators, the hotkeys menu and pause do the same:

```
hotkeygen --send pause
```

If you add the parameter –debug, you can get more details. For example, the command `hotkeygen --list --debug` will give you the paths used to customize your contexts.

Extend hotkeygen config

Defaut hotkeygen config is available in /etc/hotkeygen. Files common_context.conf and default_context.conf can be created in the folder /userdata/system/configs/hotkeygen. If any, they will be merged with the default config.

- common_context.conf is used to define hotkeys always available, whatever the context, like taking a screenshot
- default_mapping.conf is used to define which keys set which action. In theory, you don't need to customize this file.

You need to restart the hotkeygen service so that any update on these file is taken.

Using keyboardToPads to Convert Keyboard Controllers to Gamepads/Controllers

Keyboard-style input isn't always ideal for emulation, because some systems and configurations expect a gamepad/controller device. `keyboardToPads` can convert these keyboard encoders to one or more virtual gamepads/controllers.

Batocera can detect, and has prebuilt configuration files for, some of the more common keyboard encoders.

To check whether there is a prebuilt configuration file for your device, you can run: `keyboardToPads --search`. Below is an example output:

```
$ keyboardToPads --search
device /dev/input/event3 : "Ultimarc I-PAC 4"
  config file name : UltimarcIPAC4.vd209.p0430.yml
  system config found at
/usr/share/keyboardToPads/inputs/UltimarcIPAC4.vd209.p0430.yml
  you can create a custom config at
/userdata/system/configs/keyboardToPads/inputs/UltimarcIPAC4.vd209.p0430.yml
. Take example on files in /usr/share/keyboardToPads/inputs.
```

It will display your pads if any, and the file you need to create in order to customize it.

Files are in yaml format.

There are some file samples in `/usr/share/keyboardToPads/inputs`.

Here is an example of a Rec Room Masters Xtension 2 Player Plus controller:

```
# Xtension 2 Player Plus
target_devices:
  - name: Xtension 2P Player 1
    type: joystick
    mapping:
      "key:up":        "abs:hat0y:-1"
      "key:down":      "abs:hat0y:1"
      "key:left":      "abs:hat0x:-1"
      "key:right":     "abs:hat0x:1"
      "key:leftshift": "btn:south"
      "key:enter":     "btn:south"
      "key:z":         "btn:east"
      "key:leftctrl":  "btn:west"
      "key:leftalt":   "btn:north"
      "key:space":     "btn:tl"
      "key:x":         "btn:tr"
      "key:c":         "btn:start"
      "key:1":         "btn:start"
      "key:v":         "btn:select"
      "key:5":         "btn:select"
```

```
  - name: Xtension 2P Player 2
    type: joystick
    mapping:
      "key:r": "abs:hat0y:-1"
      "key:f": "abs:hat0y:1"
      "key:d": "abs:hat0x:-1"
      "key:g": "abs:hat0x:1"
      "key:w": "btn:south"
      "key:i": "btn:east"
      "key:a": "btn:west"
      "key:s": "btn:north"
      "key:q": "btn:tl"
      "key:k": "btn:tr"
      "key:j": "btn:start"
      "key:2": "btn:start"
      "key:1": "btn:select"
      "key:6": "btn:select"
  - name: Xtension hotkeys
    type: hotkeys
    mapping:
      "key:tab": "key:menu"
      "key:p":   "key:pause"
      "key:esc": "key:exit"
      ["key:1", "key:v"]: "key:exit" # exit from combination player 1 select
+ player 2 select, require batocera 43
      ["key:c", "key:space"]: "key:1" # player 2 select from combination
player 1 start+tl, require batocera 43
```

Using the example above, we can determine the following information:

- The controller is split into 3 virtual devices: 2 pads and 1 hotkey device.
- The `name` of the first virtual pad is `Xtension 2P Player 1`. Rename Xtension 2P Player 1 & 2 to the name of your controller.
- Its `type` is “joystick”. Possible types are “joystick” for pads, and “hotkeys” for hotkeys.
- `mapping` is a key-value association table to convert each key from the real device into the virtual pad. You can assign two or more physical keys to a single pad button.

Warning, don't put “PAC” in the name of your virtual names, otherwise, it will conflict.

Note that once you've created this file, you just need to unplug and replug the device so that it is taken into account.

Note that the naming and mapping of the device create a virtual pad, but you will have to configure it via Emulationstation as usual for any controller, as it wouldn't be in our

database yet). (**Main Menu → CONTROLLER & BLUETOOTH SETTINGS → CONTROLLER MAPPING**) If you don't do this, it will not work in an emulator.

The name of the first virtual pad is `Xtension 2P Player 1`. Rename Xtension 2P Player 1 & 2 to the name of your controller. Its type is “joystick”. Possible types are “joystick” for pads, and “hotkeys” for hotkeys.

`mapping` is a key-value association table to convert each key from the real device into the virtual pad. You can assign two or more physical keys to a single pad button.

You can use the following command to find the input keys :

```
evsieve --input /dev/input/event3 --print
```

You may also want to use `btn:tl2` and `btn:tr2` (left and right second triggers) depending on your context.

Troubleshooting keyboardToPads

In case of error, you can try to run this command (with the event number corresponding to your setup):

```
keyboardToPadsLauncher /dev/input/event3 run
```

Ultimarc Control Interfaces

Ultimarc is major brand of interface controllers including I-PAC, J-PAC, A-PAC, Mini-PAC, Opti-PAC, U-HID and more.

TL;DR: If your encoder is any model of I-PAC or Mini-PAC and your build doesn't have any dedicated buttons (e.g. Menu, Exit, Pause), press and hold the buttons corresponding to `[Start1]+[P1SW2]` for ten seconds. If you're lucky, your controller is now a plug 'n play USB controller you can configure like any other controller in batocera. That's it. You're done. Go play some games!

If nothing happens or you want to know more, keep reading.

The above will only work with Ultimarc's encoders (they call them control interfaces) made from 2015 on and equipped with Firmware version 50 or higher. You can check what you have with the software they offer on their website. **This is important as flashing your pre-2015 encoder with the new firmware will brick it!** If your board

is new enough, but your firmware isn't, you can update with the same tool. Read the information on their page under **“Multi-Mode”** to learn about the different modes and what you can do with them. The instructions above will make your controller run in Mode 2, which should be fine for most users. What this means is that instead or being recognised as a USB keyboard, your controller will now be recognized as one or more D-input game controller and you won't need to do any of the steps below.

If you are using Batocera 41 or greater and your Ultimarc encoder has dedicated buttons (e.g. Menu, Pause, Exit), it doesn't offer this functionality, or you don't want to upgrade the firmware see keyboardToPads. The Rec Room Master Controllers discussed in that section are based on Ultimarc encoders. If you set them to keyboard mode, (`[Start1]+[P1SW1]`) you can configure the encoder in the same way as a Rec Room Master controller. It might wind up having a different name and require its own yml config file. You can use the command `keyboardToPads –search` to find out the name and the required config file name and then follow the remaining instructions.

Ultimarc Control Interfaces for Batocera v40 or Less

Xarcade2jstick has been patched to support keyboard encoders. You may have to reconfigure a few keys of your encoder as, sadly, x-gaming X-Arcade devices didn't map as usual mame controllers.

Do not change the key mappings of your I-PAC or Mini-PAC as it is unnecessary, but the following procedure only applies if your encoder is in keyboard mode, which is the default mode when they leave the factory.

Configuring your keyboard encoder

Follow these steps :

- login to your Batocera box locally or through SSH
- find your encoder's device name with `ls /dev/input/by-id`. Usually, there is a trailing kbd in the event name. For example : `usb-Ultimarc_IPAC_2_Ultimarc_IPAC_2_9-if01-event-kbd`

PLEASE NOTE: a single encoder can have multiple possible names, so try all of them For example: `usb-Cypress_I-PAC_Arcade_Control_Interface-event-kbd` → works `usb-Cypress_I-PAC_Arcade_Control_Interface-if01-event-kbd` → doesn't work

- Now remount / as read-write `mount -o remount,rw /`
- Create an empty file that has the same name of your keyboard device found 2 steps above `touch /usr/share/batocera/datainit/system/configs/xarcade2jstick/devicename`. With the previous example : `touch /usr/share/batocera/datainit/system/configs/xarcade2jstick/usb-Ultimarc_IPAC_2_Ultimarc_IPAC_2_9-if01-event-kbd`
- Edit `batocera.conf` and set `controllers.xarcade.enabled=1` (it should already be set by default but check it)
- Save your modifications through SSH `batocera-save-overlay`
- Reboot by typing `reboot`

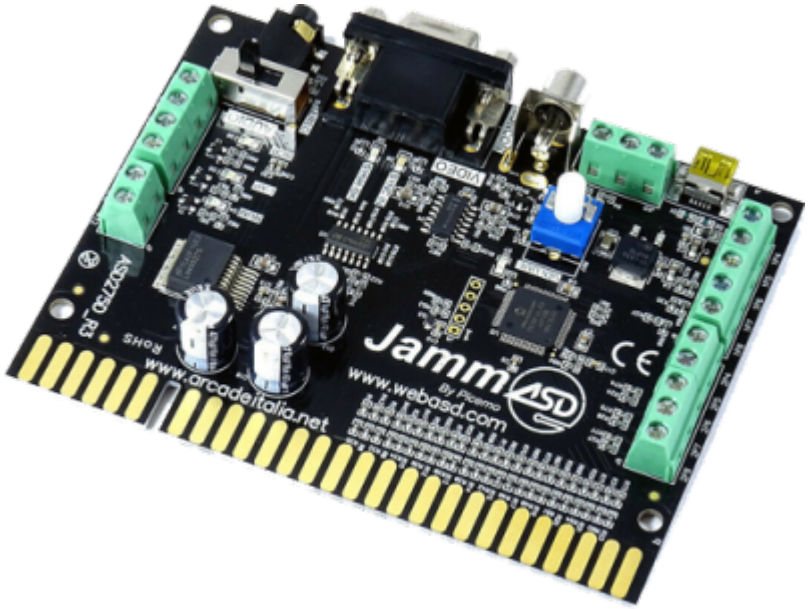
Now all your keys should be usable, that is for each player : 4 directions joystick, select, start, hotkey, A, B, X, Y, L1 and R1. For now it is not possible to attribute more buttons like L2, R2, L3 or R3

You must now configure both the controllers in the Controller Configuration menu and also associate the right controller to player 1 and 2.

Since Batocera **v34**, Ultimarc has been included. Read more here.

JammASD

This guide will help you to use your original arcade cabinet controls (sticks and buttons) under Batocera. The simplest way actually, is to use a **JammASD controller**.



For the moment, this controller (used to send VGA signal, sound, and control information to your JAMMA connector) is not known by EmulationStation, but a few tips can help you to use Batocera in your original cabinet.

JammASD and Emulation Station

Under EmulationStation, JammASD's controls are considered as a keyboard, and it's not the easiest way to configure 2 players controllers.

So, you have to change your JammASD drivers into X-Arcade drivers to use all your arcade panel.

1. Connect to Batocera using SSH

2. Type:

```
ls /dev/input/by-id
```

You will see this interface : *usb-ASD_JammASD_Interface_ASD275D-if01-event-kbd*

```
touch /userdata/system/configs/xarcade2jstick/usb-
```

```
ASD_JammASD_Interface_ASD275D-if01-event-kbd
```

3. Reboot your Batocera

Now, you only have to edit your controls under EmulationStation menu. Then, your arcade panel will be known as *Xarcade-to-Gamepad Device 1* and *Xarcade-to-Gamepad Device 2*

```
Note: With this tip, it's possible now to have START P1 + A to credit your
arcade games ^^
```

Troubleshooting

The entire article is under construction but this part is *especially* under construction.

Quick index:

Issue 1: Dragonrise encoders Player 1 and Player 2 swapped

Symptoms: I use Dragonrise encoders and player 1 and player 2's inputs are swapped

Cause: - <What's actually happening>

Fix:

For Batocera 40 and newer, the fix has been reported as not being necessary any longer, but this was an issue in previous versions.

Make sure they are all wired exactly the same, each button going to the same USB encoder.

If that's not working or is impossible to do due to your setup's requirements, it's possible to work around by using a USB quirk. Add the following onto the end of your boot line (on Raspberry Pi images, this is at `/boot/uEnv.txt`, x86_64 users can refer to here):

```
usbhid.quirks=0×0079:0×0006:0×040
```

It's added onto the end of the line, not on a new line. For instance, your boot line might end up looking like this:

```
    APPEND=label=BATOCERA rootwait quiet loglevel=0 console=ttyAML0,115200n8
console=tty3 vt.global_cursor_default=0 usbhid.quirks=0×0079:0×0006:0×040
```

Notes -

Issue 2: I have a trackball and spinner and sometimes they stop working

Symptoms: When you have both trackball and spinner plugged into Batocera, they may occasionally be read in a different than the last time the devices was booted and, as a result, they will be assigned a different `Index` number and stop working.

Cause:

Arcade trackballs and spinners are handled as mouse devices.

The problem comes from the way newer versions of RetroArch recognize mouse devices, by ID instead of name. The ID that they can have is thus unpredictable, resulting in configs (such as `retroarchConfig['input_player1_mouse_index'] = "Barcode Reader Mouse"`) no longer working.

Fix:

For now, this can be worked around using a script to automatically log and change the ID as appropriate. Save it to `/userdata/system/configs/emulationstation/scripts/game-start/mouse-fix.sh` and mark it as executable with `chmod +x /userdata/system/configs/emulationstation/scripts/game-start/mouse-fix.sh`:

mouse-fix.sh

```
#!/bin/bash

# NAME OF DESIRED MOUSE INPUT
# Can be found via the RetroArch log file or by running 'evtest'
mouse_name="Combined Analog Arcade Controls"

# RetroArch log file must be enabled for this to work
batocera-settings-set global.retroarch.log_dir
"/userdata/system/logs/retroarch"
batocera-settings-set global.retroarch.log_to_file true
batocera-settings-set global.retroarch.log_to_file_timestamp false

# Read the mouse index values from the last RetroArch log file
# and update the config for the next time RetroArch is run
# NOTE: Using '~' as a sed delimiter as some device names include the
traditional '/' delimiter
# NOTE: Pipe to 'head -1' to return the index of the first matching
device, as some devices expose multiple inputs
mouse_index=$(sed -En "s~.*Mouse.* #(.*): \"$mouse_name\".*~\1~p"
/userdata/system/logs/retroarch/retroarch.log | head -1)
if [[ -z "$mouse_index" ]]; then
    mouse_index=0
fi
```

```
batocera-settings-set global.retroarch.input_player1_mouse_index
$mouse_index
```

You may need to launch a game twice in order for it to have an effect.

Keep updated by watching this space: https://github.com/libretro/RetroArch/issues/7638. Original forum post describing this issue and its workaround: https://forum.batocera.org/d/6652-being-able-to-use-trackball-and-spinner-using-per-mouse-index

Batocera may make the workaround process easier in the future by the inclusion of `evsieve`.

Standalone MAME has its own mechanism for enabling spinner, trackball, and other mouse devices. In **ADVANCED GAME OPTIONS**, select **MAME** as the emulator, then choose **ENABLE MOUSE** > **ENABLED**.