

# Display Troubleshooting

## I have no display

If you know Batocera is booting (the network share is available, you can SSH in, you hear some music, etc.) but you have no display, it could be that Batocera is using a different display than intended. The simple solution to this is to unplug and replug the display, Batocera should automatically switch over to the newest display that was plugged in (sometimes, a laptop that is plugged in to its external port will “connect” that first before connecting its internal display, causing the internal display to be connected “last”).

If that still isn't working, try [SSH'ing in](#) and run the following:

```
export DISPLAY=:0.0
batocera-resolution listOutputs
batocera-resolution setOutput <your intended output here>
```

If that *still* isn't working, then it's recommended to skip straight to the [advanced display debugging](#).

## The edges of my screen are cut off!

Most modern TVs come with some sort of setting that slightly zooms in the image. This is normally done to prevent garbage pixels from displaying in broadcasts (remnant of a bygone era). Normally, the TV is meant to turn this off when using an input device like a PlayStation or a computer, but sometimes it fails to recognize this and keeps it on. Usually you can turn it off manually in that case.

This setting does not have a consistent name between manufacturers. Names to look out for while scouring through your option menus: “Just scan”, “Pixel ratio”, “Zoom”, “Aspect”, “Overscan”, etc. These may be in either your per-channel settings or your system settings.

## My screen keeps blinking

It could be that the TV reports as supporting a refresh rate it isn't actually tuned for, occasionally slipping outside of the expected range (which cuts off the signal momentarily). In this case, try different “similar” refresh rates, eg. if on a 60Hz display try 59.98Hz. For PCs, first try testing the different resolutions as specified in the [xrandr](#) section below, then [save it to apply on boot](#).

If on a device that uses the DRM service specifically (such as [Android TV boxes](#) and [other SBCs](#)), as weird as this sounds try booting back into the eMMC Android firmware and set the resolution to the “closest to native” as you can get for that box. For instance, if the box was to support 4K displays, set the resolution to 2160p in Android (this is irrelevant of what resolution you want to use for Batocera itself). When you reboot back into Batocera, the flashing screen problem may be solved.

## Emulation with 4K and ultrawide monitors, or problems when your screen is not fully displayed

Older 8-bit and 16bit systems, or arcade systems from the 80s and 90s were using 4:3 CRT screens. Modern displays are now 16:9 or wider, and can go up to 4K, i.e. 2160 pixels high (compared to 480 or 546 at the time!).

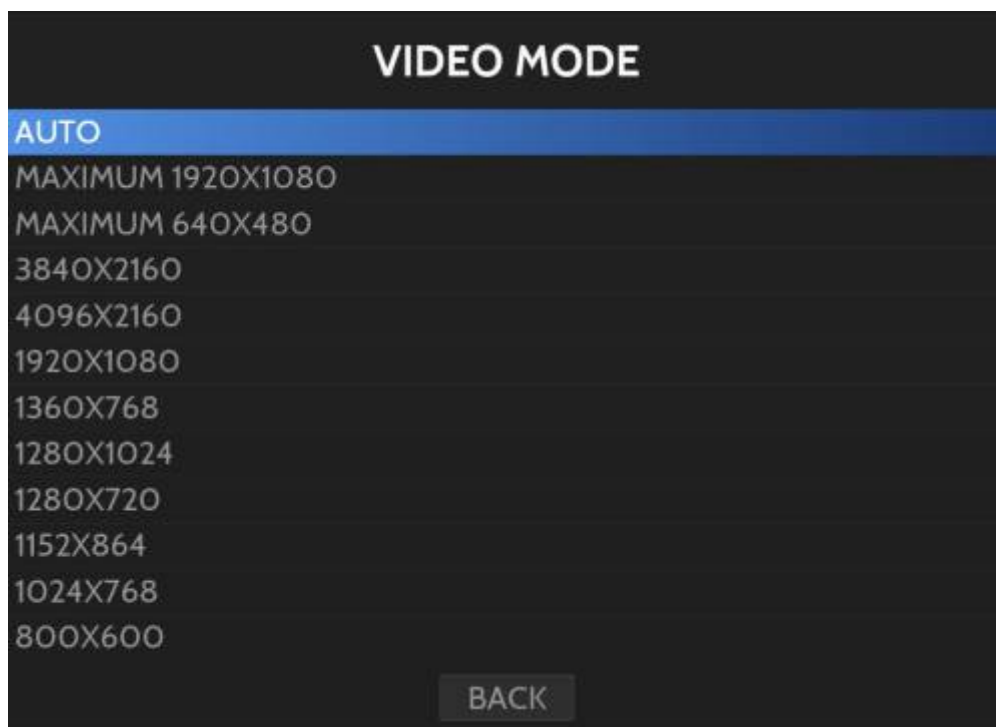
Having so many pixels to render on the screen is impactful on the system performance. When you have a 4K screen or an ultra-wide screen, Batocera will limit the resolution by default to HD 1920×1080. It's more than enough to render emulators, even the most recent ones. However, when you have an ultra-wide monitor, the display may be stretched.

For 4K monitors, because the resolution is by default resized to 1920×1080, you might see a screen that looks like this one (actually it's what 1:1 pixel scaled 1920×1080 is, centered in a 3840×2160 screen):



First, check your TV's scaling settings to ensure that it is currently set to “Stretch”, “Full screen”, “Expand”, “Fill” or some terminology similar to that.

If you've checked for that and the image is still tiny, the best solution is to manually set the resolution to “1920×1080” (or “MAXIMUM 1920×1080”) in **MAIN MENU → GAMES SETTINGS → VIDEO MODE** (you can instead do that on a system-by-system basis in the **PER SYSTEM ADVANCED CONFIGURATION** screen).



Another use case is when you have a 1280×720 TV, for example, and you want to use bezels that are designed for 1920×1080. Batocera can automatically resize the bezels, but sometimes you need to force the **VIDEO MODE** to take your 1280×720 resolution.

If you absolutely want to use the 4K resolution for whatever reason (shaders looking better, you have a non-standard wide format on your TV/monitor...), set the **VIDEO MODE** to “3840×2160” (turn on the **STRETCH BEZEL** option to force the use of bezels designed for 1920×1080 on your 4K resolution, stretching bezels is not available in Batocera **5.27** and lower). As above, this is something you can do on a system-by-system basis instead.

Setting the resolution to force 4K has an impact on the emulation performance.

## When EmulationStation feels sluggish on a 4K TV

This shouldn't be necessary for most TVs that provide a proper EDID packet, but is here for those specific situations where they don't.

There are some SBC + TV combinations where EmulationStation feels sluggish (default theme seems to be lagging behind, with a refresh rate like 10 FPS). It's really depending on your own configuration, but we have reproduced this with a Raspberry Pi 4 and a couple 4K TV models. By default, ES should negotiate with your TV to fix its resolution to 1080p, but sometimes your TV brand doesn't accept it and stays at 4K/2160p resolution. You can force a particular resolution by [editing](#) it into `/boot/batocera-boot.conf`.

## Force 1080p as the maximum resolution despite what the EDID may report

In Batocera **v31** and higher, the max - 1920×1080 resolution is now an option available to select

within the standard `es.resolution` key in `/boot/batocera-boot.conf`. To force a maximum resolution of 1920×1080, [open the batocera-boot.conf file](#) and add/alter the following line:

```
es.resolution=max-1920x1080
```

You can also force a maximum resolution of 640×480 instead for really slow devices:

```
es.resolution=max-640x480
```

For earlier versions of Batocera (**v29** and **v30**), this option cannot be selected in `es.resolution` (it will be ignored). Instead, you must use a different key in `batocera-boot.conf`:

```
system.es.maxresolution=1920x1080
```

After this, Batocera will take the most suitable refresh rate for the maximum resolution specified and use that.

## Force any specific supported resolution in ES instead of the default maximum one

You can get the list of all supported resolution modes by running the following commands [via SSH](#):

```
export DISPLAY=:0.0
batocera-resolution listModes
```

For example:

```
[root@BATOCERA /userdata/system]# export DISPLAY=:0.0
[root@BATOCERA /userdata/system]# batocera-resolution listModes
max-1920x1080:maximum 1920x1080
max-640x480:maximum 640x480
3840x2160:3840x2160
4096x2160:4096x2160
1920x1080:1920x1080
1360x768:1360x768
1280x1024:1280x1024
1280x720:1280x720
1152x864:1152x864
1024x768:1024x768
800x600:800x600
720x576:720x576
720x480:720x480
640x480:640x480
```

Any resolution listed here can be used in the `es.resolution` line in `/boot/batocera-boot.conf`. For example, [open the batocera-boot.conf file](#) and add `es.resolution=1280×720` to force ES to run at a resolution of 1280×720.

## My EDID is not working on my Raspberry Pi specifically

Certain Raspberry Pis seem to have a hard time parsing the display's EDID information correctly, to the point that it fails to even overwrite it using the above method. The Raspberry Pi can be forced to ignore the faulty EDID to allow Batocera to use whichever resolution it wants.

Navigate to `boot/config.txt` and add the following lines:

```
hdmi_ignore_edid=0xa5000080
hdmi_group=1
```

Then any HDMI mode can be used (even ones that your display won't work with, be careful!). Refer to [Raspberry Pi's official documentation](#) for more information.

## Display issues, when xrandr is your friend

**This section is for PC x86 and x86\_64, not for SBCs like Raspberry Pi or Odroid, and mostly outdated as most cases should be handled with the section above.**

This tutorial is useful if you have display issues, for instance if you need to rotate your screen, or use a lower refresh rate.

On Batocera **v30** and lower, Batocera would simply select the highest available resolution + refresh rate your display reports as supported. Obviously, when running Batocera on weak SBCs like the Raspberry Pi connected to a 4K UHD TV, this would cause visual stutter as the SBC isn't powerful enough to output a 4K resolution at 60 FPS. You would need to force a smaller resolution (like 1920×1080) to get better performance in this scenario.

Fortunately, from Batocera **v31** and higher, Batocera will default to using the 1920×1080 resolution as its maximum (and if you have one of those rare displays that support 120Hz or higher, it will default to that too for silky-smooth menu navigation! But only in EmulationStation, in-game will still be 60Hz by default). You can switch to using a genuine 4K resolution by setting your **VIDEO MODE** in **GAME SETTINGS** to 3840×2160, though even this won't have much a visual difference for most retro-games.

First of all, you need to [connect on your Batocera through SSH](#). Then run the following commands:

```
export DISPLAY=:0.0
xrandr
```

This will output your display's reported "supported resolutions" (the currently used refresh rate will be marked with an asterisk (\*) on the line of the current resolution being used). This is an example with an old 4/3 screen, but this is the same principle for other screens:

```
Screen 0: minimum 8 x 8, current 1366 x 768, maximum 32767 x 32767
LVDS1 connected primary 1366x768+0+0 (normal left inverted right x axis y axis) 290mm x 160mm
```

```
1366x768 60.03*+ 40.03
1024x768 60.00
1024x576 60.00
960x540 60.00
800x600 60.32 56.25
864x486 60.00
640x480 59.94
```

If you have an error message telling you “can't open display :0.0”, you need to physically log onto your Batocera system with the display on. On a PC from EmulationStation, press [F1] and then launch a terminal from there (xterm from the **Applications** shortcut in the left sidebar).

If you'd like to edit the display output, you can copy the current display configuration file at /usr/bin/emulationstation/ to your userdata partition at /userdata/system/custom-es-config and use that instead. On PC, you can use the file manager ([F1] on the system list) for this.

You can do so from SSH instead by running the following:

```
cp /usr/bin/emulationstation-standalone /userdata/system/custom-es-config
```

In Batocera **v31** and lower, the original file was at /etc/X11/xinit/xinitrc and the userdata copy was at /userdata/system/.xinitrc instead, so the command would instead be:

```
cp /etc/X11/xinit/xinitrc /userdata/system/.xinitrc
```

You can also edit the file from SSH by running the following:

```
nano /usr/bin/emulationstation-standalone
```

and then saving that file to /userdata/system/custom-es-config with [Ctrl] + [O].

For Batocera **v31** and lower, this would be nano /userdata/system/.xinitrc instead.

Scroll down (using the arrow keys) to the following section:

```
#####
## CUSTOMISATIONS ##
# to customize your display, you can create the file
# /userdata/system/custom-es-config
# including this kind of commands
# rotate the screen
# xrandr -o left
# xrandr -o right
# xrandr -o inverted

# change the resolution
# xrandr -s 640x480
```

```
# change the resolution and the Hz
# xrandr -s 640x480 -r 60
```

```
#####
#####
```

Just uncomment (remove the hash character from the start of the line) the corresponding line with the option you want (changing it if something else is desired). For example, to just force a resolution of 640x480:

```
[...]
# change the resolution
xrandr -s 640x480

# change the resolution and the Hz
# xrandr -s 640x480 -r 60
[...]
```

To instead change the resolution to 1280x720 at 120Hz:

```
[...]
# change the resolution
# xrandr -s 640x480

# change the resolution and the Hz
xrandr -s 1280x720 -r 120

#####
[...]
```

Save the file with [Ctrl] + [S] and quit with [Ctrl] + [Q].

EmulationStation by default runs in full-screen, and may use the old full-screen resolution even through restarts, cutting off a part of its display. For testing purposes, you can temporarily use windowed mode for the current session with:

```
exec emulationstation --windowed
```

Then restart EmulationStation with the following commands to test your new resolution:

```
/etc/init.d/S31emulationstation stop
/etc/init.d/S31emulationstation start
```

If you were to reboot Batocera at this point, you'll find that all the settings you just created have been lost. In order to make these settings permanent, you must save the [overlay](#) with the following command before rebooting:

```
batocera-save-overlay
```

xrandr can do screen rotation; very useful for old vertical screen arcade machines!

Hope this was easy for all.

## My TV isn't respecting that!

Another method to manually set your output resolution is by utilizing a custom boot script. Replace `<output>` with your current output, `<widthxheight>` with your intended resolution and `<refresh-rate>` with your intended refresh rate in the following file and place it into `/userdata/system/custom.sh`:

`custom.sh`

```
#!/bin/bash

if test -z "${DISPLAY}"
then
    export DISPLAY=:0.0
fi

## Manually set resolution
xrandr --output <output> --mode <widthxheight> --rate <refresh-rate>
```

For example: `xrandr --output HDMI-0 --mode 1920x1080 --rate 60`

Just make sure you remember that you've done this in the future, as it will override any other settings you may have set via any of the above methods.

## General troubleshooting

### What's the current X.Org X Server version installed?

Knowing which version of *X.Org X Server* is currently installed on Batocera can be essentially for further graphics troubleshooting when searching for solutions through the internet. Get the current version by executing the following command:

```
head /var/log/Xorg.0.log | grep "X.Org X Server"
```

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