OPENSOURCE SCANCONVERTER
OSSC Pro

Quick Start Guide

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OSSC Pro – Quick Start Guide

Contents

Thank you for purchasing the OSSC Pro. Please take time to read through this short document before you start using the unit.

Important safety information

Please observe the following safety precautions when using your OSSC Pro.

Use the correct power supply – OSSC Pro is designed to run with a 5 volt, 2.1 x 5.5mm positive tip power supply unit (PSU) supplying at least 2.5 amps of current. Please ensure your power supply meets these requirements. Never connect a power supply that supplies more than 5 volts. Doing so can damage the OSSC.

Turn off the power before connecting/disconnecting equipment – To prevent damage of the OSSCs integrated circuits, always turn off the power before connecting to a display or a device.

Do not expose to moisture – Droplets of moisture may contact the PCB and cause a short circuit. Never submerge the unit in water.

Keep away from fire or high heat sources – OSSC is not flammable but high temperatures, such as those from a fire or electric heater may melt the plastic casing.

Please supervise children – This product is not a toy and is not designed for use by children. Please supervise children if they use the OSSC Pro.

Beware of using the bob deinterlace mode on sources that display static graphics or text for a long period of time – This deinterlacing mode produces a constant flickering effect. This can cause image retention/burn-in to occur faster than normal. Usually this applies to LCD TVs/monitors only, CRT displays are not adversely affected by this mode. We recommend using the scaler mode and motion adaptive deinterlacing where possible, see page 15 for more details.

Overview

OSSC Pro is a next generation video processor and scaler. The device is designed to take video signals from a range of older computers and video games consoles and convert and process these signals so they are usable on modern, fixed resolution displays. While these modern displays are the primary target of OSSC Pro, it also has the capability to convert newer video signals into formats that are more suitable for older displays, such as CRTs.

Connectors and external controls (front)

In the front view picture you can see the following features on your OSSC Pro.

USB Port – For connecting and controlling external devices such as video switching hardware, or connecting accessories (note, these features are not currently available but may be added in future firmware updates).

MicroSD Card Slot – For updating the devices firmware and storing display profiles. See "Firmware Updates" on page 17 for more information.

IR Receiver – Receives commands from the remote control unit. Line of sight is required.

OLED Display – Two line character display enables the user to navigate the OSSC Pro's menus. The display is particularly useful if the user accidentally selects an incompatible output mode and therefore cannot see the OSSC Pro's on-screen menu.

Status LEDs – Indicate various functions of the OSSC Pro. The top most LED will illuminate Red when the OSSC Pro is in standby (all other LEDs will be off). A Red and Green LED illuminated together indicates an error condition with the current input. The middle LED will also blink when an IR command is received.

Finally, the blue LED at the bottom illuminates when frame lock is active. Frame lock is discussed on page 15.

Menu Button – Press this button to enter or exit the OSSC Pro's menu. Press and hold this button to toggle the OSSC between On and Standby.

Control Stick – Use the control stick to navigate through the OSSC Pro's menus. Move the control stick up, down, left or right to navigate the menus. Click the control stick in to choose a menu option. Press the Menu button to cancel your selection or exit the menus.

Connectors (left side)

Expansion Connector – For adding expansion boards to the OSSC Pro. Expansion boards can add new functionality and input and output options.

Connectors (Right side)

JTAG Connector - For software development purposes and firmware updates.

AV1 (SCART) Input – Connect an RGB SCART source to this input. Note the input must be RGB or YPbPr, S-video and composite SCART sources are not supported and require transcoding into RGB first. Only European spec RGB SCART cables are supported, the less common Japanese JP21 cables must be used with a converter, a suitable one can be purchased here:-
https://videogameperfection.com/products/jp21-to-scart-adapter/

Connectors (Back)

AV3 Audio input/output connector – This connector can be set to be an audio input (assignable to AV1, AV2 or AV3) or as an audio output/break out from AV1 SCART.

AV3 In – Standard D-Sub15 (VGA) connector. You can connect sources such as the Sega Dreamcast or a retro gaming PC.

AV2 In – Connect component video or RGB with sync on green sources to this input.

AV2 Audio - Connect any analogue audio source to these two RCA connectors. This audio input can be assigned to any video input.

SPDIF Input – For connecting high quality digital audio input from compatible consoles or devices. This audio input can also be assigned to any video input.

AV4 In – Connect a standard digital video source to this port. DVI sources will require an adapter.

Video Out – Connect a standard high definition digital cable to this port and then connect the other end of the cable to your television or monitor.

Power Connector – Connect a 5 volt, 2.1 x 5.5mm positive tip power supply unit (PSU) supplying at least 2.5 amps of current. Note that use of the OSSC Classic power supply is **not** recommended as it does not provide sufficient amps for the OSSC Pro.

Remote control

The OSSC Pro uses a new, larger remote control to control all of its functions. We will cover the most important functions in this guide, while you can learn about other features by visiting the OSSC Pro Wiki page (https://junkerhq.net/xrgb/index.php?title=OSSC_Pro).
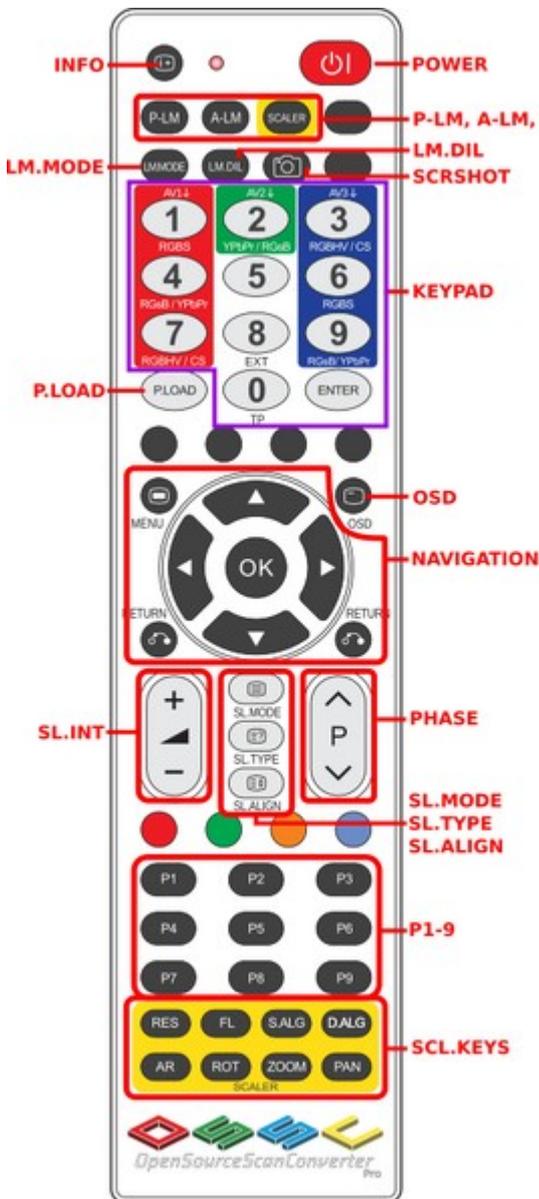
Info – Display information about the current active source and output mode.

Power – Toggles between On and Standby modes.

P-LM, A-LM, Scaler – Use these buttons to toggle between the OSSC Pro's three operating modes.

Keypad – Select the active input using these button controls.

P.Load – Profile load. Use this button, followed by a number on the keypad, to instantly load a display profile.

Navigation – Use the Menu button to call up the OSSC Pro's menu. Use the directional arrows to navigate the menu. Use the OK button to choose a menu option, or enter a sub menu. Use the "Return" button to go back up to the previous menu.

Scanline controls – Use these controls to adjust the post processing scanlines, or to adjust image phase on optimal profiles. For more information on this, consult the wiki.

P1 to P9 – These buttons are reserved for future use.

Scaler keys – These keys provide various shortcuts when in scaler mode. The AR key can be pressed to quickly select a new aspect ratio. The Zoom and Pan buttons can be used to adjust the size of the image, or move the image if it is off centre.

Connecting your OSSC Pro

Connect a suitable power supply (5 volts, 2.5 amp positive tip) to the OSSC Pro's power connector. Connect a DVI or HDMI cable between the video out on the OSSC and your display. Almost any display that supports HDMI or DVI-D can be used, but please remember some output modes do not adhere fully to DVI/HDMI specifications so compatibility cannot be guaranteed. For displays that only have analogue inputs, a converter is required. OSSC Pro does not use HDCP, so any basic converter should work.

Ensure the PSU is turned on at the wall, the red Standby light should then illuminate on the front of the unit. Power on your OSSC Pro using the power button on the remote control or by holding the menu button on the front of the unit. The OLED display on the front of the unit should light up and display "TP   480p", as shown in the picture.

Switch your display to the correct input. If everything is working correctly, a grey test card pattern should appear.
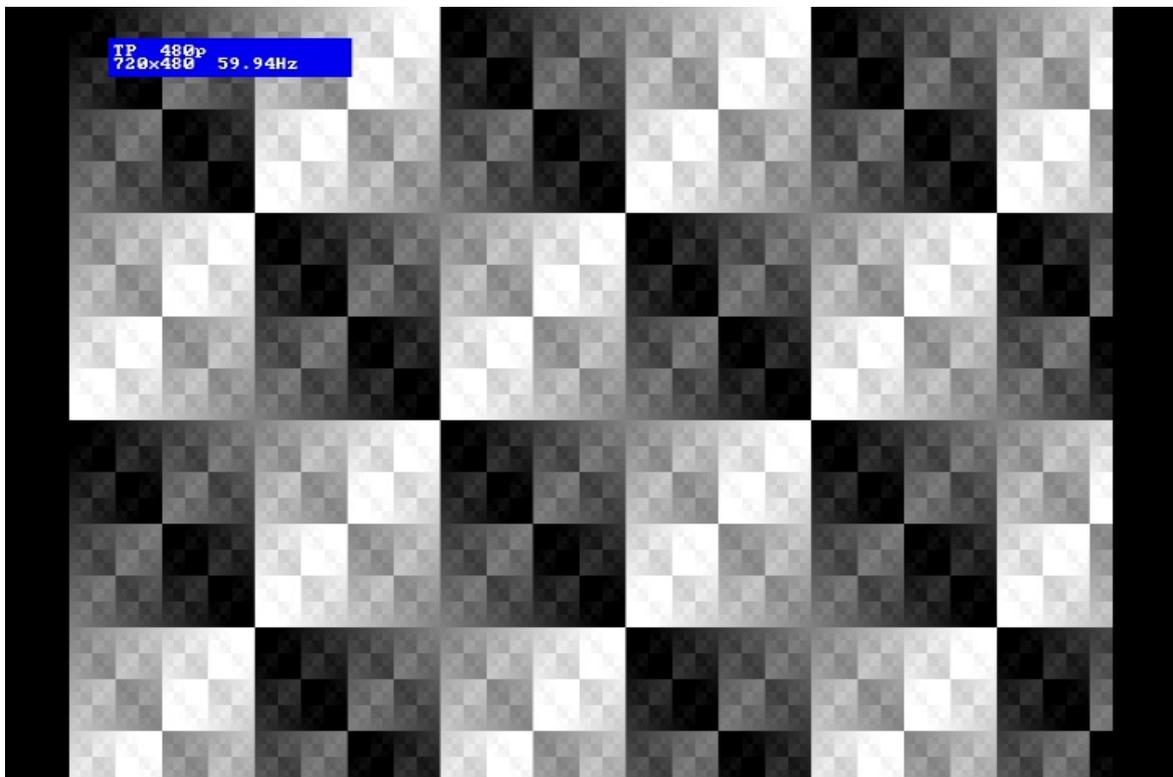
Finally, power on your source device and press the Menu button on the OSSC remote. Use the menu navigation buttons and OK to choose "Input Select" and then select the relevant input for your console. For standard RGB SCART devices, choose "AV1_RGBS". Component video sources most commonly use "AV2_YpbPr". VGA sources, such as a Sega Dreamcast, require "AV3_RGBHV". For digital video sources, choose "AV4".
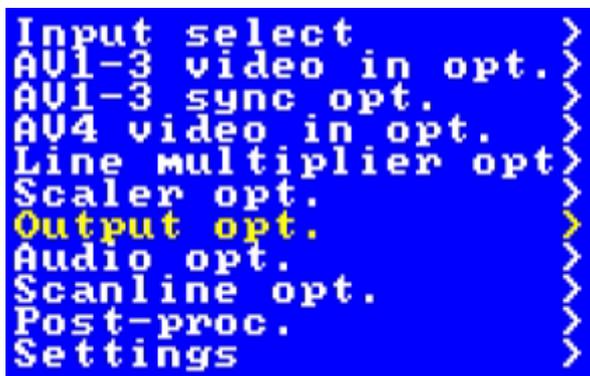
You should now see a picture from your video device.

Congratulations, you have now set up your OSSC Pro and you can start experimenting with its features.

Getting to know your OSSC Pro

All settings for the OSSC Pro are configured using the on-screen menu. To call up the menu at any time, press the Menu button on the remote. The root or top level menu is shown below.

You can return to the top level menu at any time by pressing the "Return" button on the remote (multiple presses may be required).

The menu is also shown on the front OLED display, though navigating the menu on your TV/monitor is usually easier and more convenient as more information can be displayed.

One scaler, three modes

The OSSC Pro has three operating modes.

- Pure line multiplier
- Adaptive line multiplier
- Scaler

Pure and adaptive line multiplication modes offer a lag free scaling solution for retro video consoles, while the scaler mode offers more flexible output options, at the expense of some input lag.

We recommend users choose either adaptive line multiplication mode or scaler mode. Adaptive line multiplication offers many more options over the old, pure line multiplication that also featured on the classic OSSC. Theoretically, the pure line multiplication mode has slightly less input lag than the adaptive mode, but in practise this difference is so small that it is imperceptible. Refer to the following table for a summary of all the modes and their advantages and disadvantages.

	Pure LM	**Adaptive LM**	**Scaler – framelock**	**Scaler - no framelock**
Latency	Max 2 lines	Max 60 lines	~1 frame	1-2 frames
Display compatibility	Variable	Very high	Very high	Full
Deinterlace alg.	Bob, Noninterlace restore	Bob, Noninterlace restore	Bob, Weave, Motion adaptive	Bob, Weave, Motion adaptive
Scaling alg.	X: oversample, integer Y: integer	X: oversample, integer Y: integer	X: oversample, polyphase Y: polyphase	X: oversample, polyphase Y: polyphase
Input mode switch delay	Very fast	Very fast	Fast	Instant
Transformations	Pan	Pan	Zoom, Pan, (Rotate*)	Zoom, Pan, (Rotate*)
Postprocessing opt.	Scanlines, Border, Masks	Scanlines, Masks	Scanlines, Masks, BFI	Scanlines, Masks, BFI

* The rotation function is planned for a future firmware update.

Changing modes

To change between line multiplier and scaler mode, navigate to the top level menu and then select "Output opt." and press "OK". you should now see the options shown below.

Use the left and right navigation buttons on the remote to change between "Line multiplier" and "Scaler".

To change between adaptive and pure line multiplier mode, first choose Line multiplier mode by following the steps above, then use the Return button on the remote, if necessary, to get back to the top level menu.

Now, navigate to "Line multiplier opt" and press "OK".

You can now use the remote to choose "Pure" or "Adaptive" mode. Adaptive mode is recommended for most users.

Connecting consoles, PCBs or other hardware

Power your OSSC Pro off before you connect or disconnect external hardware. For the best results, always use the best quality connection from your source device to your OSSC Pro.

For most vintage or retro systems, using a properly wired RGB SCART cable connected to the AV1 input is the best and easiest option. If RGB is not available, component video (YPbPr) can be used instead and will produce equally good results.

For any systems that output digital video (including systems with after-market modifications), use a digital cable with the AV4 input. Systems with after market modifications may require you to put them into "pass through" or "direct mode", so that OSSC can handle any upscaling.

Systems which output only composite video or S-Video will require a converter or transcoder, such as the Koryuu.

You can connect almost any video source to the OSSC Pro. All analogue video formats are supported as well as most digital formats (excluding 4k). More information on connecting different types of hardware is covered on the wiki.

Once you have connected your hardware, power on the OSSC Pro and select the appropriate input using the remote. Now, power on your console, PCB or vintage computer hardware. You should now see it displayed on your TV or monitor.

Scanlines

Vintage games consoles such as the Sega Megadrive and Nintendo SNES used a special screen mode which resulted in alternating lines on a CRT display being left blank. Typically when people in the retro-gaming communities refer to scanlines, they mean the blank lines between parts of an image on a CRT that were a result of this screen mode. OSSC Pro allows you to simulate these scanlines, making the image look more authentic. You can enable or disable post-processing scanlines on the OSSC Pro by pressing the Menu button on the remote and navigating to "Scanline opt."

You can also configure various scanline settings by using the SL buttons on the remote.

In scaler mode, the OSSC Pro also supports custom scaling algorithms (see page 15 for more information). Some of these may add scanlines to the image as the image is scaled. In this case, post-processing scanlines should be turned off.

How pronounced the scanlines would look on a real CRT varies greatly between displays, so set the scanline strength to your taste.

Setting output resolutions

In line multiplication mode the OSSC Pro takes in one scanline and outputs two or more, resulting in a lag free conversion of 240p to 480p, 720p or higher.

To change the line multiplication output resolution, press the Menu button so that the on screen menu is displayed and use the Return button if necessary to navigate to the top menu. Select "Line multiplier opt" and press "OK". The menu shown below will be displayed.

Choose "Pure LM opt." or "Adaptive LM opt." depending on the mode you are in, for this example we will assume adaptive mode. The menu shown below will then appear.

```
240p proc            >   1280x720 (Line3x)
288p proc            >   1920x1080 (Line4x)
350-400p proc        >   1280x720 (Line2x)
480i proc            >   1920x1080 (Dint+L4x)
576i proc            >   1920x1080 (Dint+L4x)
480p proc            >   1920x1080 (Line2x)
576p proc            >   720x576 (Passthru)
720p proc            >   1280x720 (Passthru)
1080i proc           >   1920x1080i (Dint+L2x
240p/288p mode       >   Generic 4:3
350-400p mode        >   Generic 4:3
480i/576i mode       >   Generic 4:3
480p mode            >   Generic 4:3
576p mode            >   Generic 4:3
```

You can now choose the output resolution based on the input resolution. The most common input resolutions are 240p for NTSC region retro consoles and 288p for PAL/European region consoles.

There is no right or wrong setting for the output resolution, results will vary based on the scaler and processing in your television or monitor. Some users prefer a softer, more natural CRT type look while others prefer a sharper image.

You cannot damage your display by trying the different line multiplication modes. If your display refuses to show a picture, simply use the remote to change to a different mode again.

If the OSSC Pro is set to scaler mode, the range of output resolutions is more flexible. Again, some experimentation may be required to find the best looking or most compatible modes for your display.

Changing resolution in scaler mode works in much the same way, but is done by accessing "Scaler opt." from the top level menu. This menu is shown in the picture below.

```
DFP output mode      >   1920x1080 (50-120Hz)
CRT output mode      >   240p (60-120Hz)
Output type          >   DFP
Framelock            >   On
Aspect ratio         >   4:3
Scaling algorithm    >   Auto
Edge threshold           7
Deinterlace mode     >   Motion adaptive
Motion shift             3
240p/288p mode       >   Generic
350-400p mode        >   Generic
480i/576i mode       >   Generic
480-512p mode        >   Generic
576p mode            >   Generic
<    Adv. timing     >
```

Ensure "DFP output mode" is selected, then use the left and right buttons on the remote to change the resolution. You can also press "OK" to see a list of all supported resolutions.
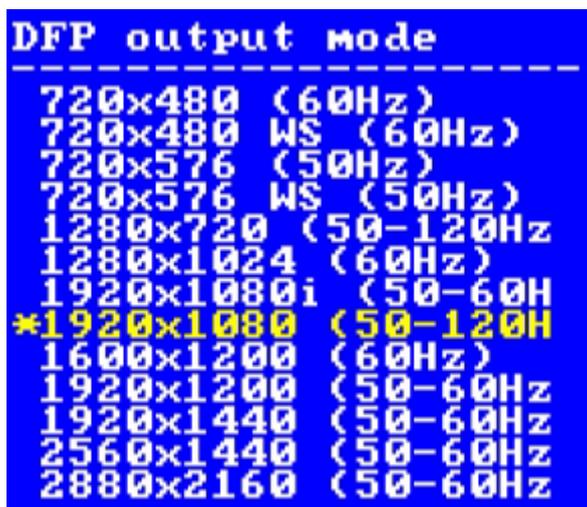
Usually the best results in scaler mode are obtained by choosing the highest resolution supported by your display. If you do not get a picture, or the picture intermittently disappears or blanks, choose a lower resolution.

Framelock

Framelock (the fourth option down in the Scaler opt menu) is an important option to understand. When Framelock is on, output refresh rate is matched to the input. This results in a smooth image with no judder. While this is desirable, it may be necessary to turn Framelock off for the purpose of compatibility or if your game title uses multiple screen modes (such as a game which uses interlace in the menu screens but progressive modes during gameplay). In these cases, choose "Off (50hz)" for PAL material or "Off (60hz)" for NTSC.

In line multipler modes, framelock is always on and cannot be disabled.

Scaling algorithm

You can use this option to change the appearance of the scaled image. Generally, it is just a matter of choosing which option you personally think looks the best. For more information on these options or to use the custom scaling algorithms, please visit the wiki.

Interlace video and the OSSC Pro

Certain retro consoles and computers (e.g Sony PS2, Nintendo Gamecube) output in interlace modes. These modes send alternating scanlines to the display in each frame and were how standard definition analogue television was broadcast. To display interlace video on modern displays, it must be deinterlaced first.

In line multiplication mode, the OSSC Pro can deinterlace content like this with no input lag.

However, the image that is produced tends to exhibit some flickering and combing artefacts.

If the flicker is distracting, we recommend you use the scaler mode and the motion adaptive deinterlacer. To activate the motion adaptive deinterlacer, follow these steps.

1) First ensure you are in scaler mode. See "Changing modes" on page 12 to confirm.

2) On the main menu, navigate to "Scaler Opt." and press OK.

3) Navigate to "Deinterlace mode" and choose "Motion adaptive".

4) If your game changes between interlace and non-interlace during play, you may also need to disable Framelock, choose "Off (50hz)" for PAL material or "Off (60hz)" for NTSC.

Try to avoid interlace software and modes where possible. If your software title supports progressive or 480p mode then be sure to enable this.

Beware of using the OSSC Pro's bob deinterlacer on sources that display static graphics or text for a long period of time. On certain types of display, the constant flickering can cause image retention/burn-in to occur faster than normal. Usually this applies to LCD TVs/monitors only, CRT displays are not adversely affected by this mode.

Fine tuning the image

Just like with the OSSC Classic, it is possible to fine tune image settings using the advanced timing options. For most sources, fine tuning the image is not necessary and you will get excellent results with the defaults, but if you are interested in learning more about fine tuning, please visit the wiki page and also our support forums here:-

https://videogameperfection.com/forums/forum/ossc/ossc-discussion-support/

Audio input and output

The OSSC Pro's analogue audio inputs and the SPDIF input are all fully assignable. For example, if you have a source such as a Sega Dreamcast, which has a D-Sub 15 video output and 2 x RCA audio outputs, you can connect the video output of the console to the AV3 input, and the audio to the AV2 RCA audio inputs.

It is then simply a matter of assigning the audio input AV2 to the video input AV3. To do so, open the OSSCs menu and use the "Return" button, if necessary, to get to the top most level. Then, choose "Audio opt.". The resulting menu is shown below.

Using this menu you can assign different audio inputs to different video inputs. For example, to use the AV2 RCA audio inputs with AV3 (VGA/D-Sub 15), you simply select "AV3 audio source" and change it to "AV2 (analogue)".

Note that it is not possible to assign AV4 (digital) audio to any other input.

Remember, routing your OSSCs video output through equipment such as home theatre receivers or video processors can in many instances add input lag. Routing the signal through home theatre receivers, switches, splitters, audio integrators or other video processors can also increase the time it takes to re-sync the signal on game titles which switch between 480i and 240p screen modes.

Firmware updates

New features are periodically added to the OSSC Pro in the form of firmware updates. The devices firmware can be updated using an MicroSD card. Unlike the OSSC Classic, no special tool is required to write the firmware update to the card. All that is needed is a FAT32 formatted MicroSD card. Firmware updates are typically no bigger than 3MB, so any capacity card will suffice.

To update the firmware, remove your MicroSD card from the OSSC Pro, insert it into your computers SD card reader and then copy over the new firmware file. Ensure that the firmware file is renamed to "ossc_pro.bin".

Once the firmware is copied over, re-insert the MicroSD card into the OSSC Pro and power on the device. Open the on-screen menu and choose "Settings" and then "Fw. Update". Follow the on-screen prompts in order to update the firmware.

To check for the latest firmware, visit this page:-

https://junkerhq.net//xrgb/index.php?title=OSSC_Pro#Firmware_update

Troubleshooting

Symptom	Possible Cause	Solution
Image has a vertical flicker/shimmer effect	Interlace source connected	Set deinterlace mode to motion adaptive, see page 15.
Horizontal jitter/wobble on image	Fine tuning required	Try adjusting low pass filter settings. See the wiki for recommendations
Missing pixels in the image	Wrong optimal mode selected	Use generic 4:3 or Generic 16:9 mode instead
No audio	Display incompatibility	Use a different display or choose a different output mode
No audio	Sample mode incompatible	Change the Sampling format under "Audio options" to 24bit/48kHz
No image	Sync mode set wrong	Press the source button again to change sync mode. Most common sync type is RGBs for SCART, YPbPr for component and RGBHV for DSub15/VGA
No image	Incompatible output mode selected	Switch to a compatible mode.
No image	HDMI/DVI handshake failed	Power cycle the OSSC Pro
Black screen and NO SYNC message	Source not powered on	Check power to source device
Black screen and NO SYNC message	Source not outputting RGBs or YPbPr	Make sure your source device outputs RGB and your SCART cable is wired for RGB.

More information

For more information on using your OSSC Pro, see the Wiki page here –
https://junkerhq.net//xrgb/index.php?title=OSSC Pro

For technical support, visit the support forums here -
https://www.videogameperfection.com/forums/forum/ossc/

Disposing of your OSSC Pro

If your OSSC Pro malfunctions, please contact us via e-mail or through our website to arrange repair or replacement. All OSSC Pro units sold by VideogamePerfection.com/VGP Media come with one years warranty. Outside of warranty, we can service and repair most faulty units.

Please consider contacting us before disposing of your OSSC Pro, even if you no longer want it. If you do need to dispose of the unit, in most countries you can recycle the unit for free at your local recycling centre. To find your nearest centre in the UK, visit the Recycle More website at http://www.recycle-more.co.uk and type in your postcode. In the Republic of Ireland, visit https://www.weeeireland.ie/household-recycling/where-can-i-recycle/

If you live outside of the UK or ROI, please check with local authorities or contact us to arrange for a return of your unit.